

**SONY®**

PORTABLE VIDEOCASSETTE RECORDER

# **BVW-50P**



**BETACAM SP™**

MAINTENANCE MANUAL  
Volume 1 1st Edition  
Serial No. 10001 and Higher

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## 8. VIDEO SYSTEM ALIGNMENT

(This section will be available as a supplement.)

## Volume-2

## 9. BLOCK DIAGRAM

## 10. SEMICONDUCTOR PIN ASSIGNMENT

## 11. SCHEMATIC DIAGRAM

## 12. PRINTED WIRING BOARD

## 13. SPARE PART AND FIXTURE

# SECTION 1

## SERVICE INFORMATION

### 1-1. SUPPLIED ACCESSORIES

1. Carrying case
2. Extension harness  
(for connection between VRP-1 and CC-47 Boards)

### 1-2. OPTIONAL ACCESSORIES

1. BVR-3
2. RF modulator
3. Remote Control Cable  
(for connection between BVW-50P and BVR-3)  
RCC-B5G (5m)  
RCC-B10G (10m)  
RCC-B30G (30m)
4. AC power adaptor  
AC-500CE
5. Battery Pack  
BP-90A  
NP-1B
6. Battery Charger  
BC-210CE : for BP-90A  
BC-1WA : for NP-1B

### 1-3. SPECIFICATION

Power requirements	: 12V DC
	• a BP-90A battery pack (Ni-Cd, 5.0Ah)
	• two NP-1B battery packs (Ni-Cd, 2.3Ah)
	AC power using an AC-500CE AC power adaptor
Power consumption	: PB/EE REC, 29W SAVE REC, 19W
Operating temperature	: 0°C to +40°C
Storage temperature	: -20°C to +60°C
Operating humidity	: 25% to 85%
Weight	: 6.6kg
Dimensions	: 317×140×348mm (w/h/d)
Tape speed	: 101.51mm/s
Record and playback time	: Max. 100min. (with a BCT-90ML video cassette)
Fast forward/rewind time	: For L cassette (BCT-90ML), less than 7 min. For S cassette (BCT-30M), less than 2.5 min.
Fast forward/rewind speed	: Max. ±16 times normal speed (with monochrome picture)
Search speed	: Max. ±5 times normal speed (with color picture)
Continuous operating time	: Approx. 180 min. using a fully charged BP-90A battery pack operated in SAVE REC Mode
Video cassette	: 1/2 inch Betacam, Betacam SP cassette Metal tape: BCT- 5M/10M/20M/30M/5ML/10ML/20ML/30ML/60ML/90ML and compatible Oxide tape: BCT- 5G/10G/20G/30G/5GL/10GL/20GL/30GL/60GL/90GL and compatible

## VIDEO

Video recording system

Luminance : FM

Chrominance : Compressed time division multiplexed FM

		Metal tape	Oxide tape
Band width	Luminance	30Hz to 4.5MHz +0.5/-3.0dB	30Hz to 4.1MHz +0.5/-6.0dB
	Chrominance (R-Y, B-Y)	30Hz to 1.5MHz +0.5/-3.0dB	30Hz to 1.5MHz +0.5/-3.0dB
Signal to noise ratio	Luminance	more than 51dB	more than 48dB
	AM	more than 53dB	more than 50dB
	FM	more than 53dB	more than 50dB
K-factor (2T pulse)		less than 2%	less than 3%
DG		less than 3%	less than 3%
DP		less than 3°	less than 3°
Y/C delay		less than 20nsec	less than 20nsec

## AUDIO

Audio recording system

LNG : AC Bias

AFM : FM

		Metal tape	Oxide tape
Frequency response	LNG	40Hz to 15kHz +1.5/-3.0dB	40Hz to 15kHz ±3.0dB
	AFM	20Hz to 20kHz +0.5/-2.0dB	---
Dynamic range AFM		more than 80dB	---
Signal to noise ratio	LNG (at 3% distortion)	more than 72dB	more than 50dB (without the audio NR system)
	AFM	less than 1.5%	less than 2%
Distortion (at 1kHz)	LNG	less than 0.5%	---
	AFM	less than -55dB	---
Crosstalk (at 1kHz)	LNG	less than -65dB	---
	AFM	less than -55dB	---
Wow and flutter LNG		less than 0.15% rms	



#### 1-4. MATCHING CONNECTORS

When external cables are connected to the various connectors on the connector panel during maintenance, the hardware listed (or equivalents) must be used.

Panel Indication		Connector
SC IN VIDEO IN VIDEO OUT 1/2 TC IN TC OUT		1-560-069-11, BNC, MALE
CAMERA		1-564-183-00 26P, MALE (ROUND TYPE)
DUB/COMPONENT OUT		1-560-995-00 12P, MALE (ROUND TYPE)
DC OUT		1-565-654-11 4P, MALE (ROUND TYPE)
RFU OUT	VIDEO DC AUDIO	RFU ADAPTOR AV CABLE
DC IN 12V		1-518-362-00 XLR 4P, FEMALE
REMOTE		1-560-651-00 D-SUB 9P, MALE 1-561-749-00 JUNCTION SHELL
AUDIO IN		1-508-084-00 XLR 3P, MALE
AUDIO OUT		1-508-083-00 XLR 3P, FEMALE

#### 1-5. INPUT/OUTPUT SIGNAL CONNECTORS

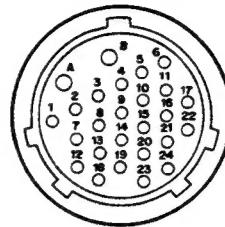
##### INPUT

VIDEO IN :	Composite : 1.0Vp-p, 75Ω Advanced sync : 4.0Vp-p, 75Ω
CAMERA :	Composite : 1.0Vp-p, 75Ω Component : . Luminance, 1.0Vp-p, 75Ω . R-Y/B/Y, 0.7Vp-p, 75Ω
AUDIO IN : CH-1 to CH-4	-60/-20/+4dBs (selectable) more than 3 kΩ, balanced
TC IN :	0.5~18Vp-p, more than 10 kΩ, unbalanced
SC IN :	2.0±1.0Vp-p, 75Ω, unbalanced

##### OUTPUT

VIDEO OUT 1,2 :	Composite : 1.0Vp-p, 75Ω
DUB/COMPONENT OUT :	Luminance : 1.0Vp-p, 75Ω Chrominance : R-Y, 0.7Vp-p, 75Ω B-Y, 0.7Vp-p, 75Ω
AUDIO OUT :	+4dBm (600Ω load), balanced . EARPHONE -20dBs max. (8Ω load), adjustable . HEADPHONES -20dBs max. (8Ω load), adjustable
TC OUT :	2.2Vp-p ±3dB (600Ω load), unbalanced 1.2Vp-p ±3dB (75Ω load), unbalanced

## CAMERA (26P)

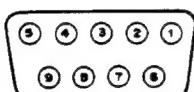


No.	SIGNAL	SIGNAL DIRECTION CAMERA VTR	SPECIFICATION
A	DC+12V	←	Unregulated +12V DC Power Supply
B	GND	—	DC Power Return
1	COMPOSITE VIDEO	—○—○→	$Z_i = 75\Omega \pm 5\%$
2	GND (COMPOSITE VIDEO)	—○—○—	
3	GND (LUMINANCE)	—○—○→	$Z_i = 75\Omega \pm 5\%$
4	LUMINANCE	—○—○→	$Z_i = 75\Omega \pm 5\%$
5	R-Y VIDEO	—○—○→	$Z_i = 75\Omega \pm 5\%$
6	GND (R-Y)	—○—○—	
7	B-Y VIDEO	—○—○→	$Z_i = 75\Omega \pm 5\%$
8	GND (B-Y)	—○—○—	
9	MIC (X)	—○—○→	$Z_i = 3k$ to $10k\Omega$
10	MIC (Y)	—○—○→	BALANCED
11	GND (MIC)	—○—○—	
12	VTR START/STOP	—→	START $5_{-1}^{+3}$ V      STOP $0_{-0}^{+0.5}$ V or open
13	BATT, IND	←	<p>before end</p> <p>14.5V Max open, 2-3V with <math>300\Omega</math> load A/B: <math>50 \pm 10\%</math> duty, frequency <math>1 \pm 0.2\text{Hz}</math> or <math>4 \pm 0.8\text{Hz}</math></p>
14	(SPARE)	—	
15	REC/TALLY	←	<p><math>5.0_{-0.5}^{+1.0}</math> V      REC Reset 10-100ms  <math>2.5 \pm 0.5</math> V      Warning Alarm  <math>0 \pm 0.3</math> V      VTR Connected      VTR Dis-connected</p> <p>A/B: <math>50 \pm 10\%</math> duty, frequency <math>1 \pm 0.2\text{Hz}</math> or <math>4 \pm 0.8\text{Hz}</math></p>
16	(SPARE)	—	

No.	SIGNAL	SIGNAL DIRECTION CAMERA VTR	SPECIFICATION
17	SHIELD	—	VTR GND
18	PB VIDEO	← →	VS=1Vp-p±1dB DC: 0±200mV Zo=75Ω±5%
19	GND (PB VIDEO)	—	
20	VTR SAVE	↔	AUDIO MONITOR Zo: Low Impedance Level: -6dBs VTR SAVE $R_i \geq 100k\Omega$ ( $R_i$ : input DC resistance)
21	(SPARE)	—	
22	COLOR FRAMING PULSE	→	$Z_i \geq 100k\Omega$
23	(SPARE)	↔	
24	(SPARE)	↔	

REMOTE IN

&lt;External view&gt;



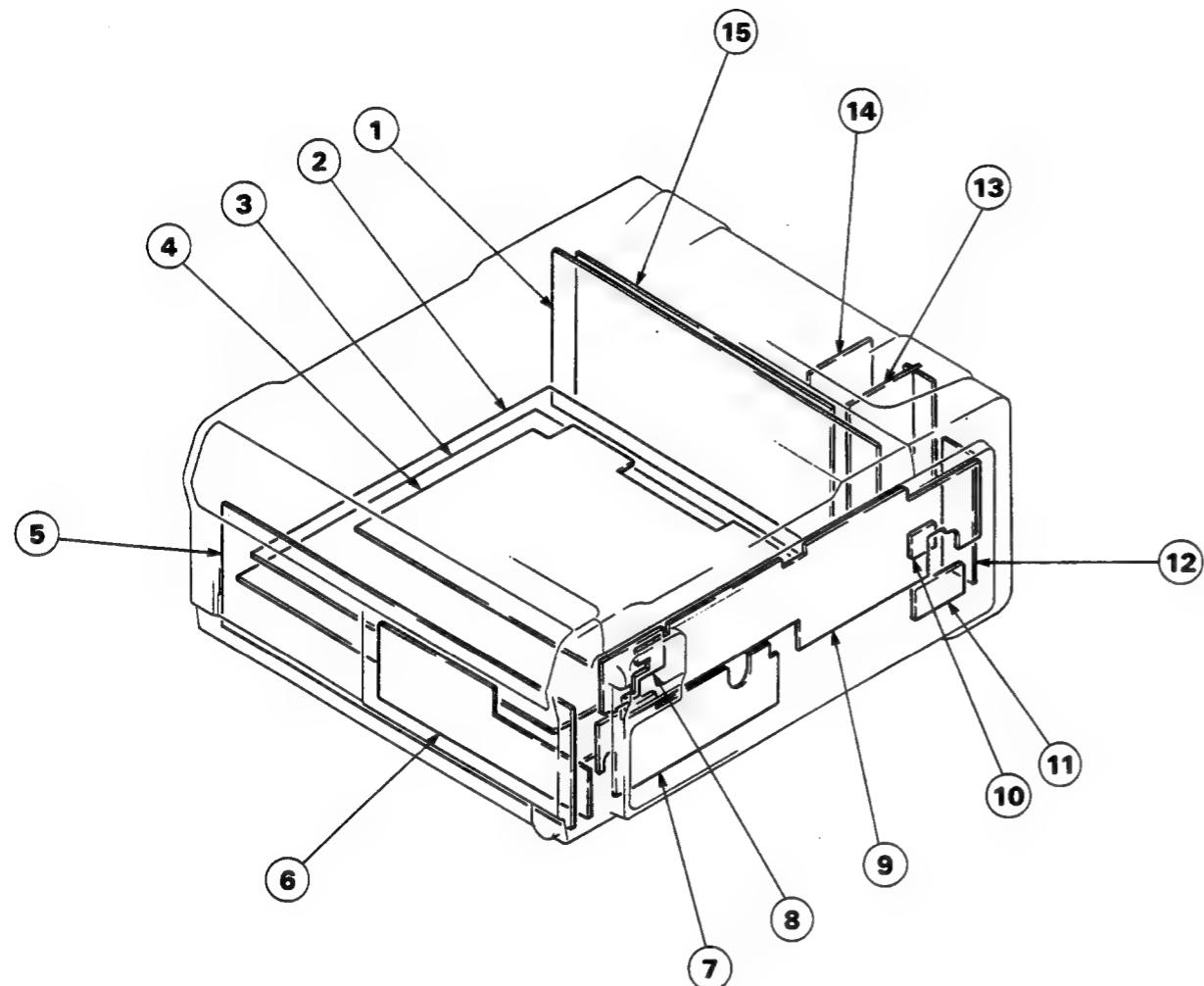
PIN No.	SIGNAL
1	Frame Ground
2	Receive A
3	Transmit B
4	Transmit Common
5	Spare
6	Receive Common
7	Receive B
8	Transmit A
9	Frame Ground

## 1-6. PRINTED CIRCUIT BOARDS

System	Board	Circuit Function
VIDEO	PA-119	Video PB Head Amplifier Video REC Head Connection Video REC Head/PB RF Connection Drum FG/PG Amplifier
	LD-39	Y/C Separator & CTDM Modulator/Demodulator
	VRP-1	Video Output/REC Amplifier
	TBC-19	Time Base Corrector
	CC-47	Video Encoder Video Input/Meter Driver
AUDIO	AU-142	LNG Audio REC/PB System AFM REC/PB System
	VR-118	Audio Level Control Power Switch
	DUS-339	Phones Jack
	FE-11	Full Erase Oscillator
	CP-164/A	Audio Input/Output System Panel Switches
SERVO	SST-1	Servo & System Control Time Code
SYSTEM CONTROL	CS-25	Cassette In Detector
	CS-26	Cassette Up/Down Detector
TIME CODE	SE-158	Thread/Unthread End Detector Cassette/Tape Detector
	DET-15	Threading FG Detector
	TR-57	S-Tension Detector
	CON-18	TC IN/OUT Connector
POWER	BC-23	Battery Terminal
	DC-52	External DC IN
	FU-52	Fuse
	PSW-12	DC-DC Converter
OTHER	MB-335	Mother Board
	SR-50	Slip-Ring

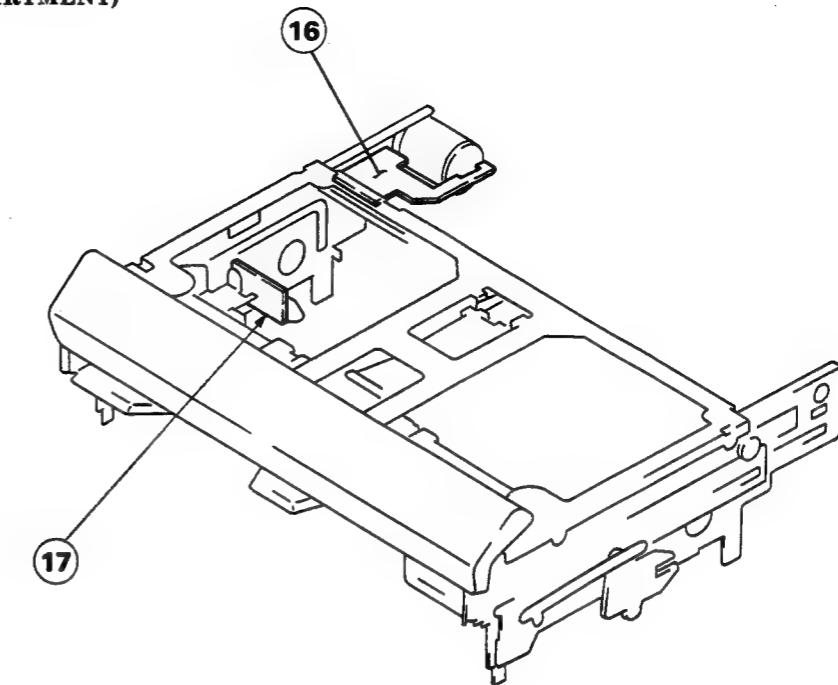
## 1-7. MAIN PARTS LOCATION

### 1-7-1. Location of Printed Circuit Boards



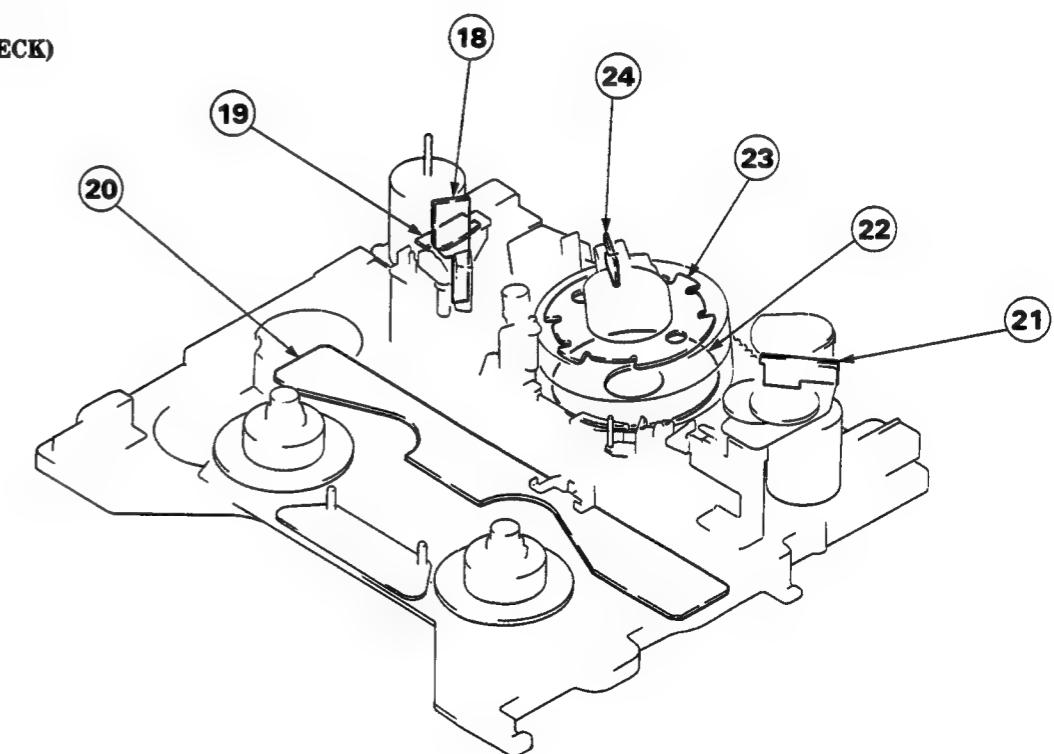
- |                 |                |
|-----------------|----------------|
| ① MB-335 Board  | ⑨ CP-164 Board |
| ② SST-1 Board   | ⑩ DC-52 Board  |
| ③ VRP-1 Board   | ⑪ CON-18 Board |
| ④ TBC-19 Board  | ⑫ FU-52 Board  |
| ⑤ KY-207 Board  | ⑬ PSW-12 Board |
| ⑥ VR-118 Board  | ⑭ BC-23 Board  |
| ⑦ CC-47 Board   | ⑮ AU-142 Board |
| ⑧ DUS-339 Board |                |

### (CASSETTE COMPARTMENT)



- ⑯ CS-25 Board  
⑰ CS-26 Board

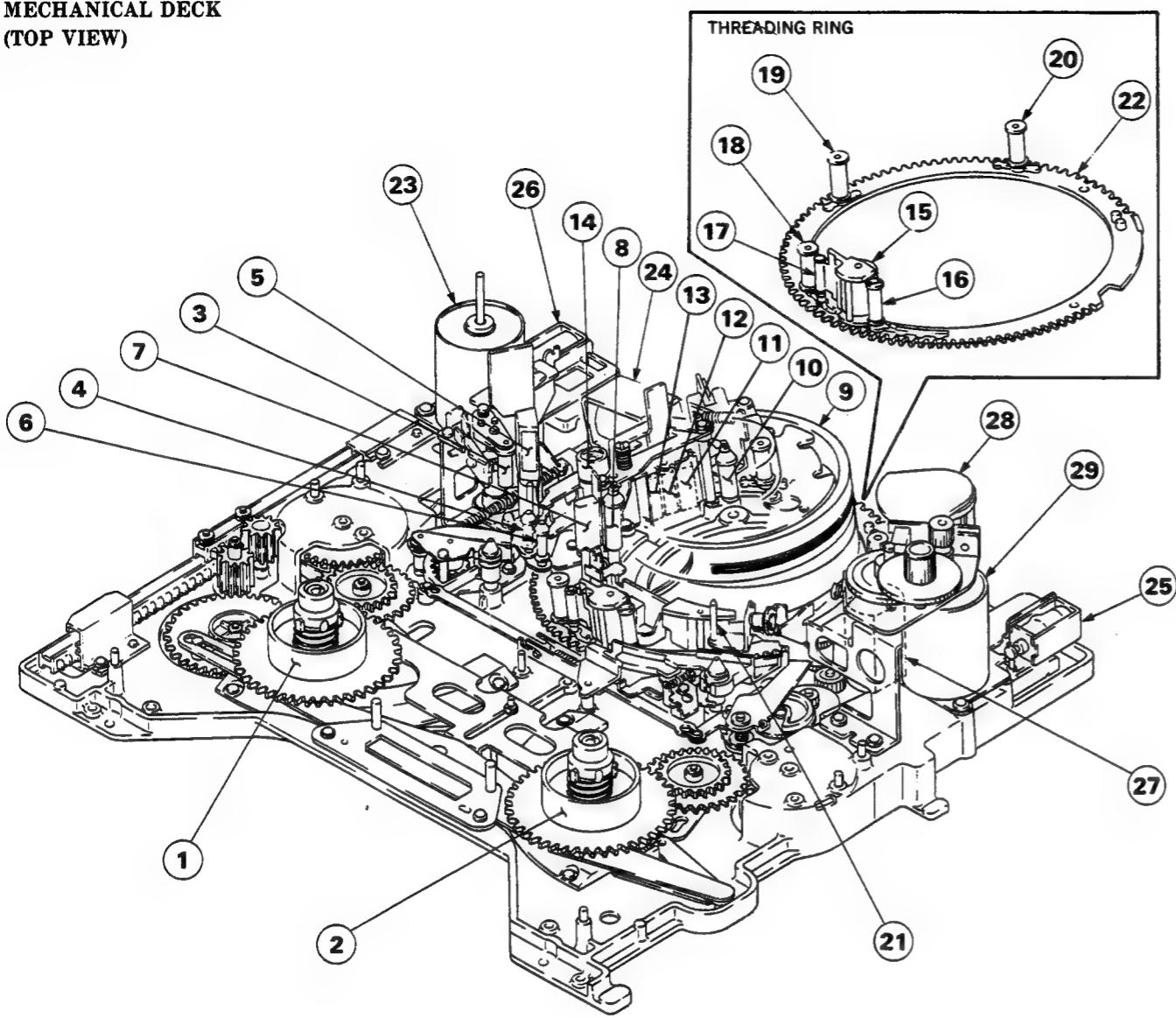
### (MECHANICAL DECK)



- |                |                |
|----------------|----------------|
| ⑯ FE-11 Board  | ⑰ LD-39 Board  |
| ⑰ TR-57 Board  | ⑱ PA-119 Board |
| ⑲ SE-158 Board | ⑲ SR-50 Board  |
| ⑳ DET-15 Board |                |

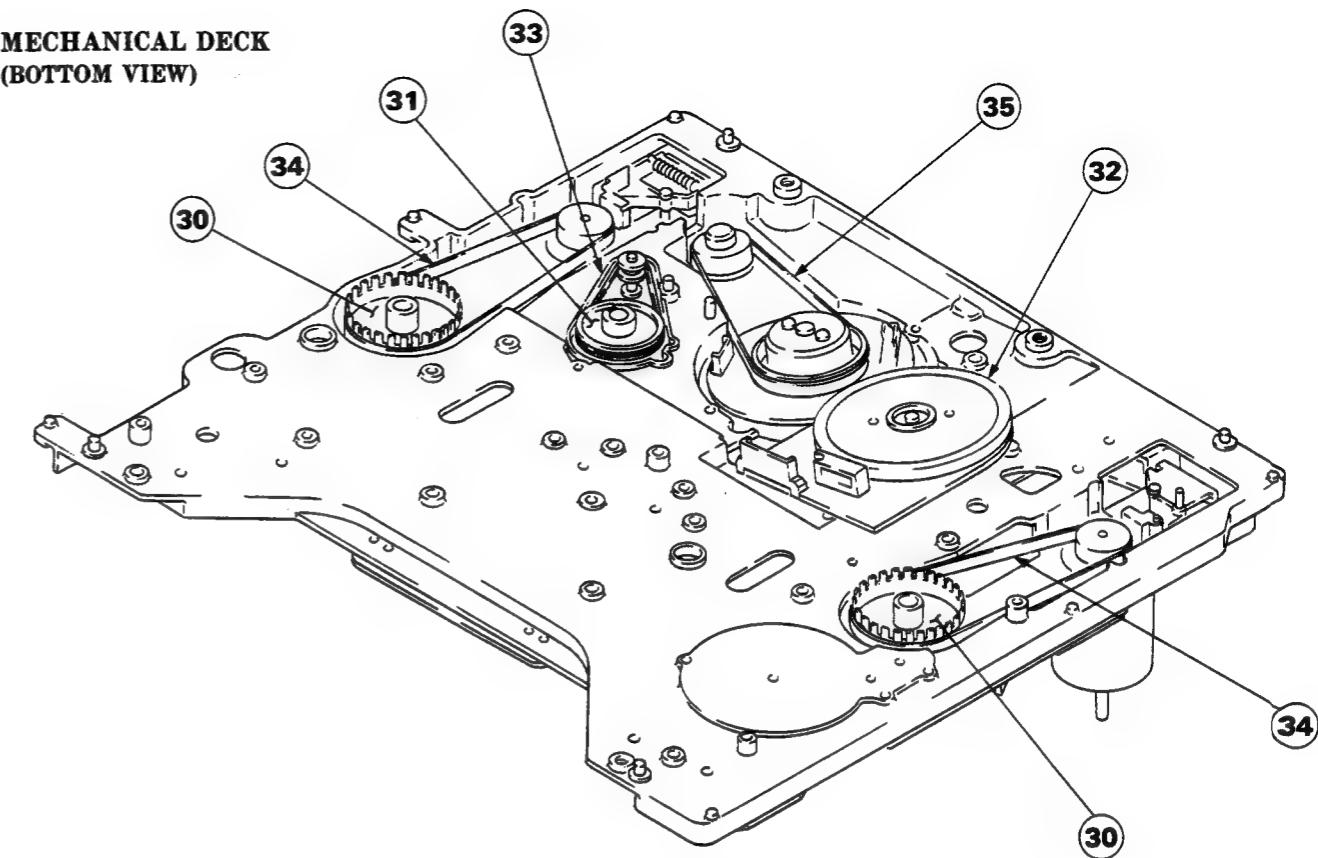
### **1-7-2. Location of Main Mechanical Parts/Components**

## **MECHANICAL DECK (TOP VIEW)**



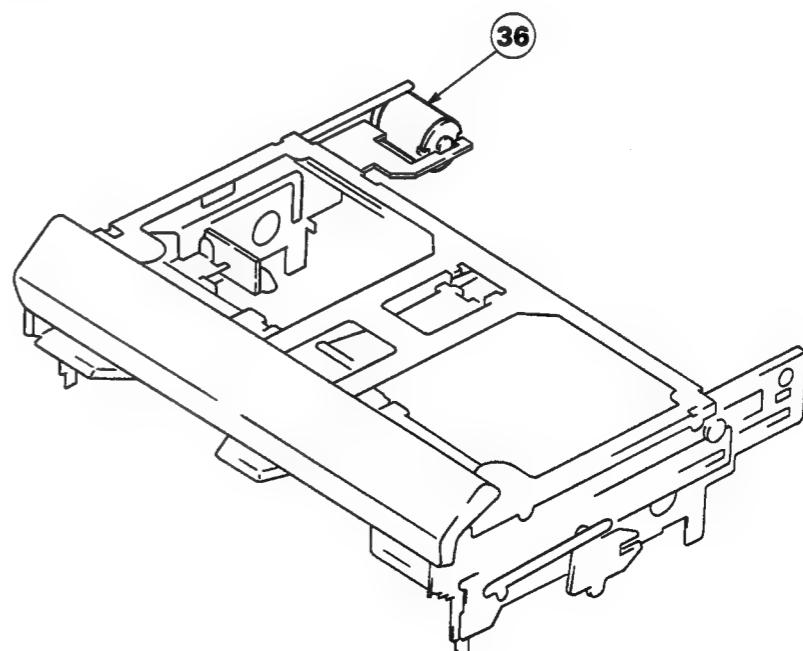
- |                     |                    |
|---------------------|--------------------|
| ① S Reel Table      | ⑯ Threading Roller |
| ② T Reel Table      | ⑰ Pinch Guide      |
| ③ Tension Regulator | ⑱ RG1              |
| ④ TG-2              | ⑲ RG2              |
| ⑤ Full Erase Head   | ⑳ RG3              |
| ⑥ TG-3              | ㉑ Slant Guide      |
| ⑦ CTL Head          | ㉒ Threading Ring   |
| ⑧ Entrance Guide    | ㉓ S Reel Motor     |
| ⑨ Head Drum         | ㉔ Pinch Solenoid   |
| ⑩ Exit Guide        | ㉕ T Brake Solenoid |
| ㉖ Audio Erase Head  | ㉗ S Brake Solenoid |
| ㉗ Audio RP Head     | ㉘ Threading Motor  |
| ㉙ Audio Conf. Head  | ㉙ Drum Motor       |
| ㉚ Capstan Shaft     | ㉚ T Reel Motor     |
| ㉛ Pinch Roller      |                    |

**MECHANICAL DECE**  
**(BOTTOM VIEW)**



- |                       |                  |
|-----------------------|------------------|
| ⑩ Relay Pulley        | ⑪ Threading Belt |
| ⑫ Deceleration Pulley | ⑬ Reel Belt      |
| ⑭ Capstan Motor       | ⑮ Drum Belt      |

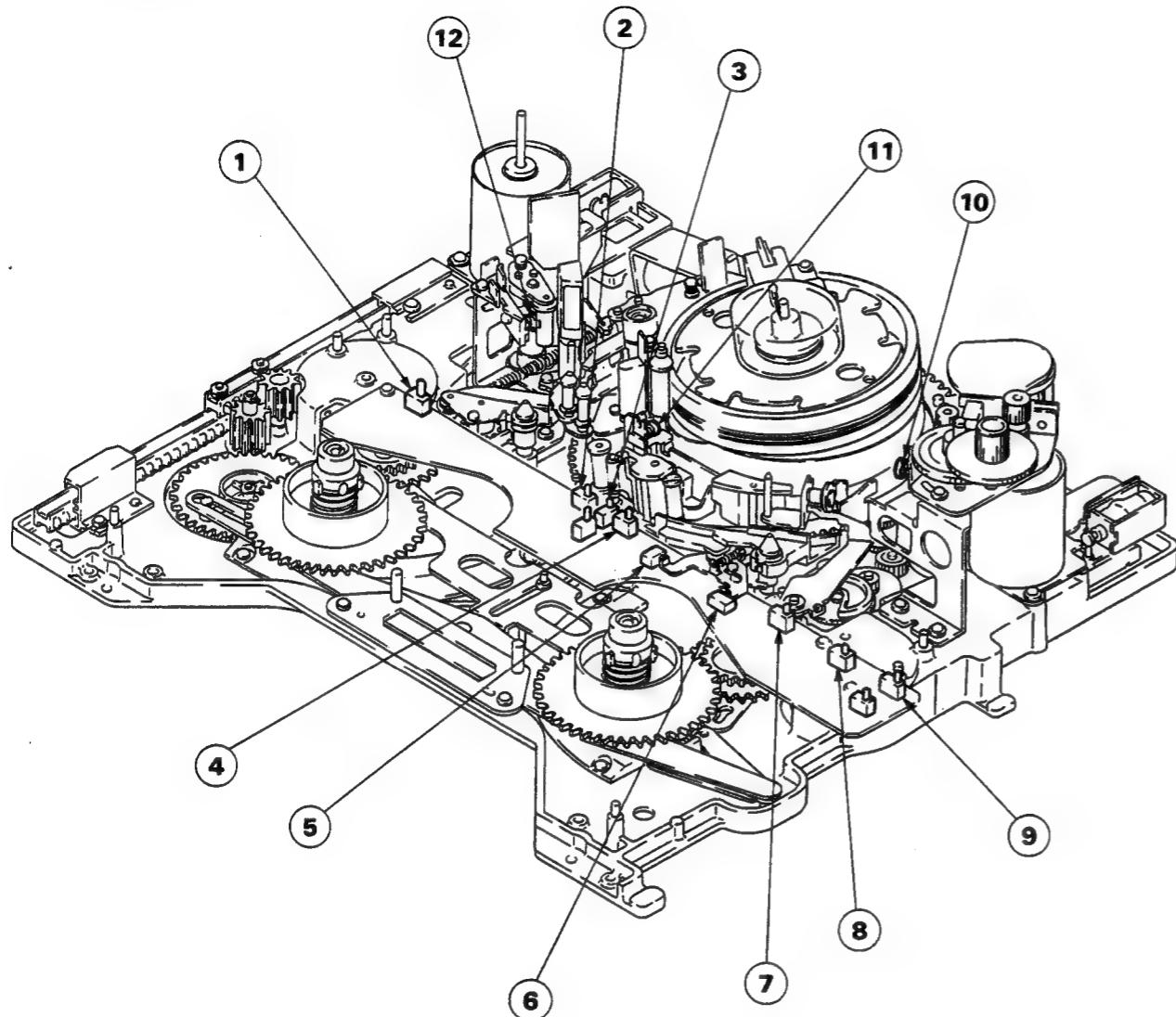
#### **CASSETTE COMPARTMENT**



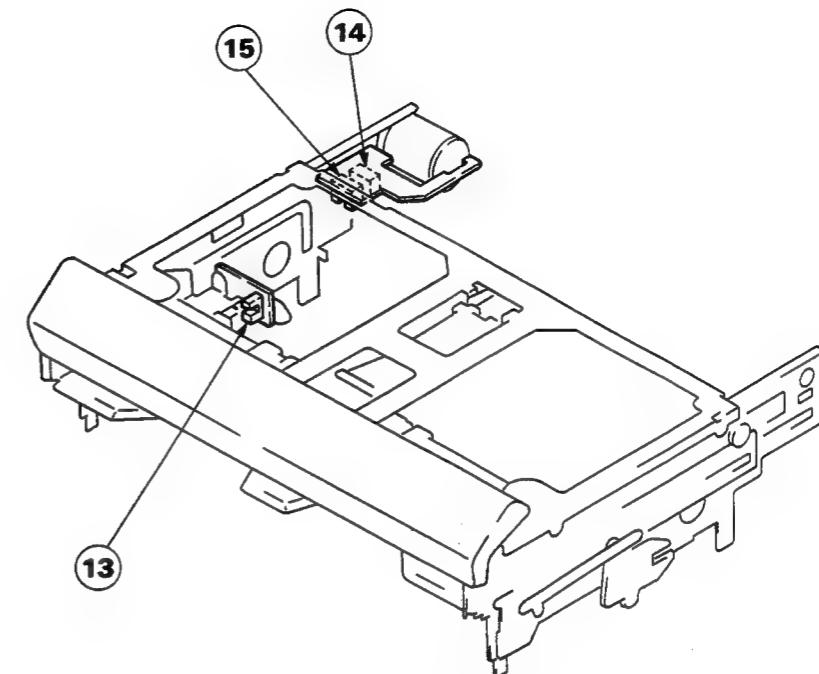
- #### ⑥ Cassette Compartment Motor

1-7-3. Location of Sensors/Switches

MECHANICAL DECK



CASSETTE COMPARTMENT



- |                               |                                     |
|-------------------------------|-------------------------------------|
| ① Metal S Tape Rec Inhibit SW | ⑦ Oxide S Tape Rec Inhibit SW       |
| ② Reel Hub dia. Detect SW     | ⑧ Metal/Oxide Common Rec Inhibit SW |
| ③ Metal/Oxide Detect SW       | ⑨ L Cassette Sensor                 |
| ④ Tape Thickness Detect SW    | ⑩ Tape Beginning Sensor A           |
| ⑤ Thread End SW               | ⑪ Tape Beginning Sensor B           |
| ⑥ Unthread End SW             | ⑫ Tape End Sensor                   |

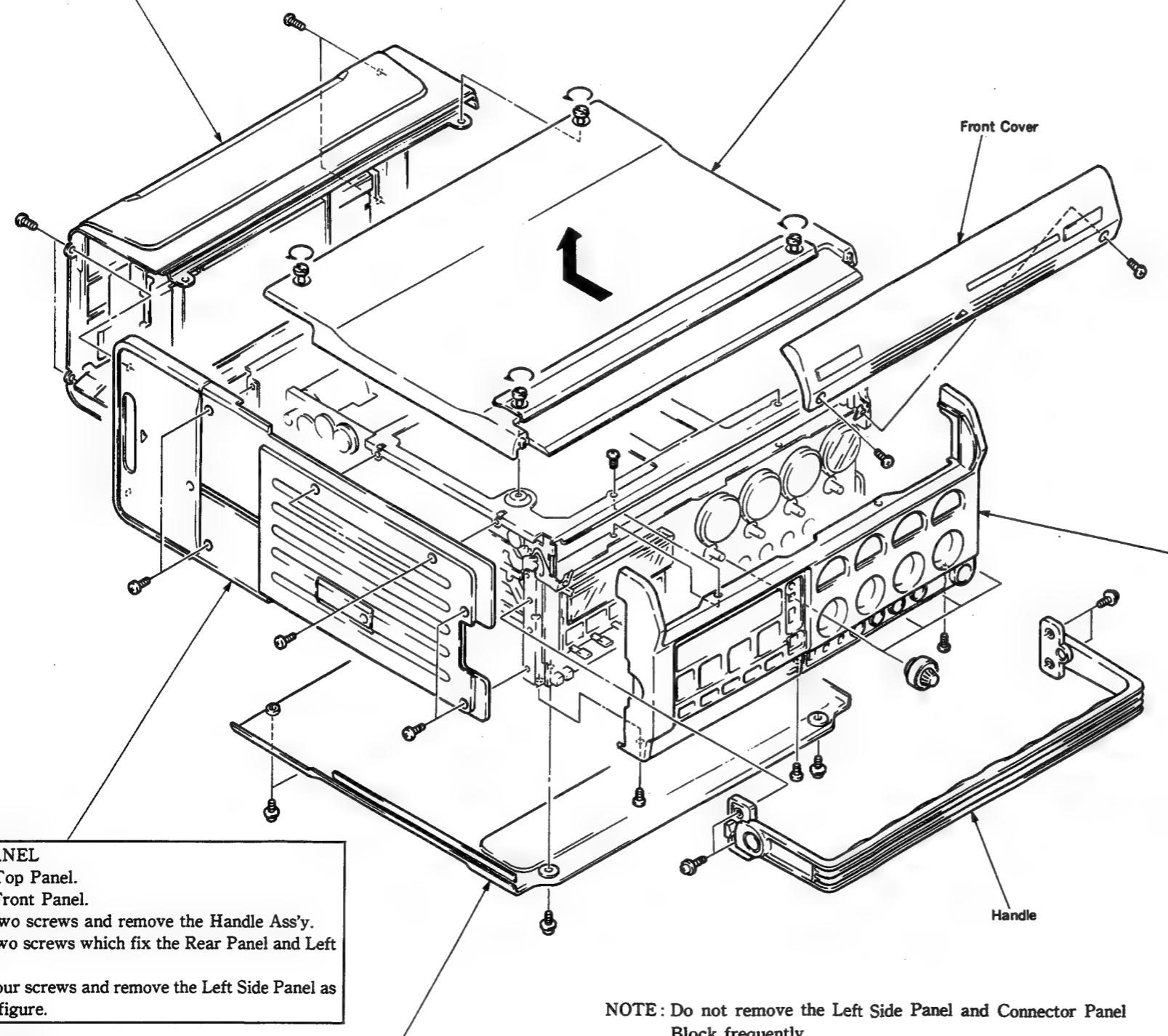
## 1-8. REMOVAL OF CABINET

### REAR PANEL BLOCK

1. Remove the Top Panel.
2. Remove the four screws and pull out the Rear Panel Block.
3. Remove the faston terminals from FU-52 and MB-355 Boards.
4. Remove the Rear Panel Block from the unit.

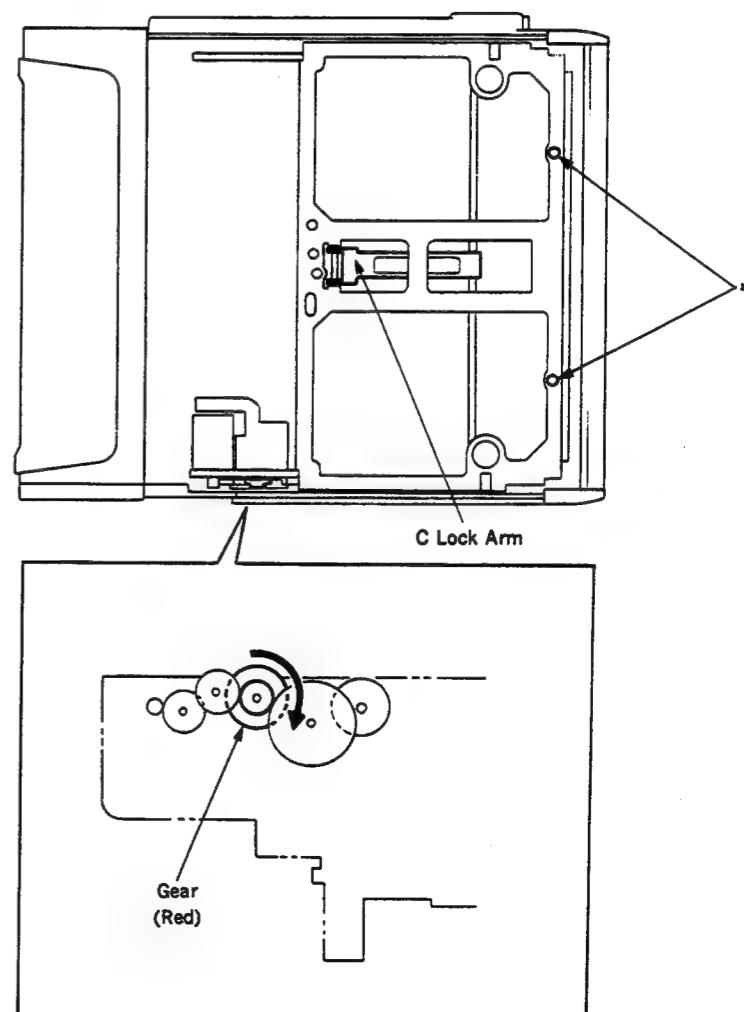
### TOP PANEL

1. Loosen the four coin screws and move the Top Panel in the direction of the arrow. (The coin screws cannot be removed because of stoppers.)



### FRONT PANEL

1. Remove the two screws and remove the Front Cover.
2. While lifting up the C Lock Arm of the Cassette Compartment, turn the gear (red) in the direction of the arrow. Slide the Cassette Compartment and remove the two screws from the hole (\* mark) as shown in the figure.
3. Remove the three screws and remove the Front Panel. At this time, the five control knobs are out from the Front Panel, do not lose them.



### LEFT SIDE PANEL

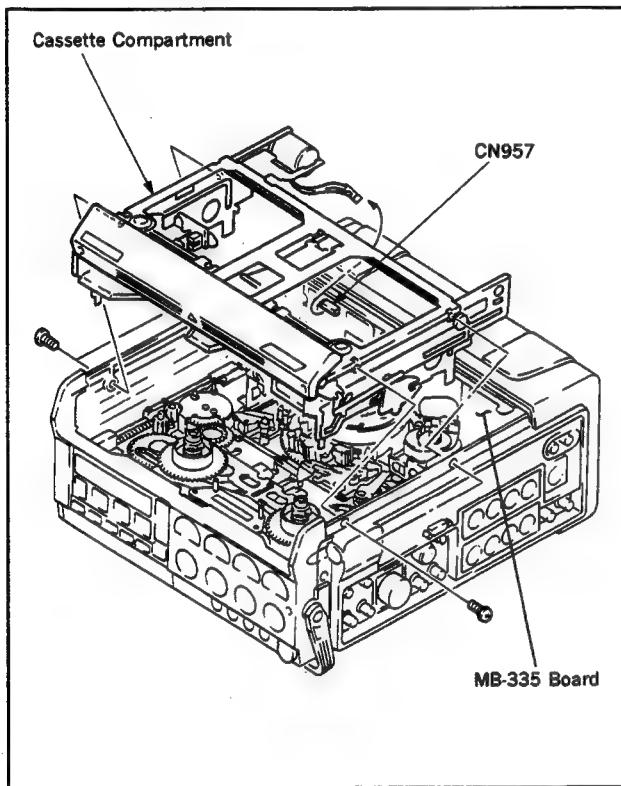
1. Remove the Top Panel.
2. Remove the Front Panel.
3. Remove the two screws and remove the Handle Ass'y.
4. Remove the two screws which fix the Rear Panel and Left Side Panel.
5. Remove the four screws and remove the Left Side Panel as shown in the figure.

### BOTTOM PLATE

1. Loosen the four screws and remove the Bottom Plate.

## 1-9. REMOVAL OF CASSETTE COMPARTMENT

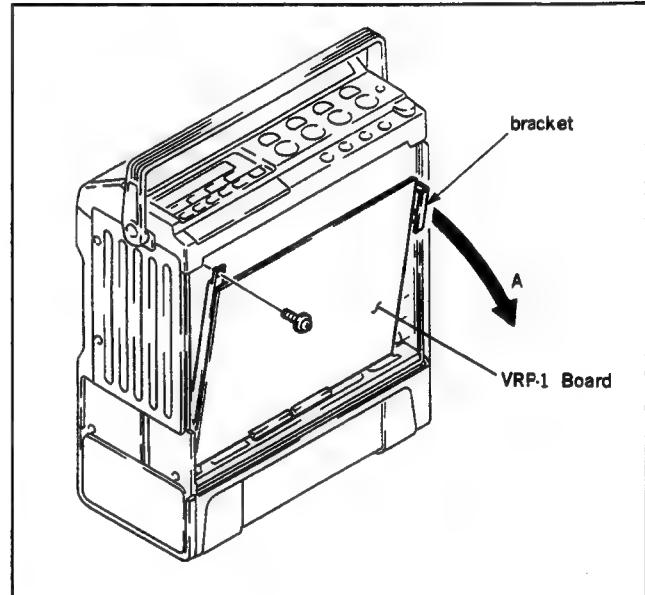
- (1) Put the unit into the Intermediate Position referring to section 3-1.
- (2) Open the Front Cover and remove the four screws from the sides of the unit as shown in the figure.
- (3) Disconnect the CN957 of the motor from the MB-335 Board.
- (4) Remove the Cassette Compartment from the unit.



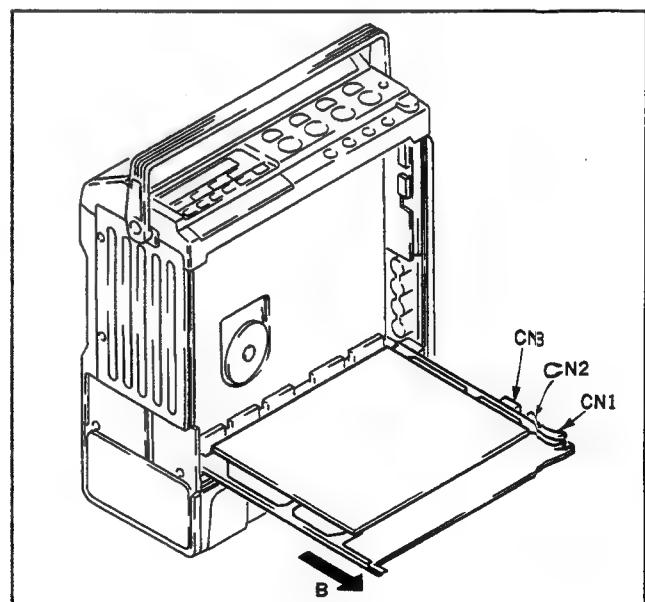
## 1-10. REPLACEMENT OF PRINTED CIRCUIT BOARD

### 1-10-1. VRP-1 Board

- (1) Remove the Bottom Plate.
- (2) Remove the screw and pull the bracket in the direction of arrow A. Open VRP-1 Board.



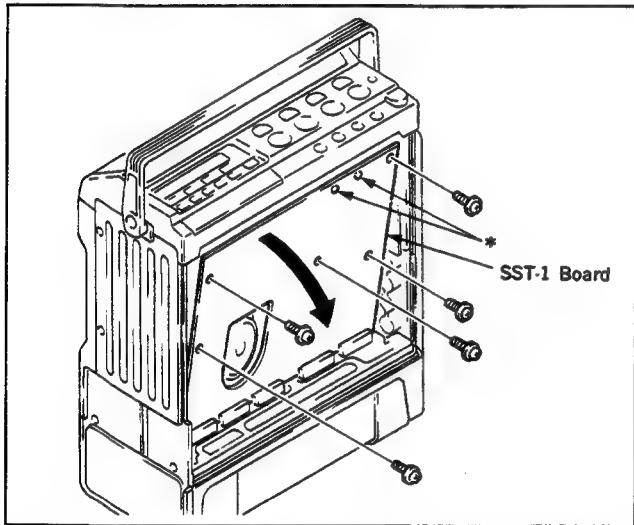
- (3) When removing, pull VRP-1 Board in the direction of arrow B.
- (4) When installing, connect CN1, CN2 and CN3 to CC-47 Board securely.



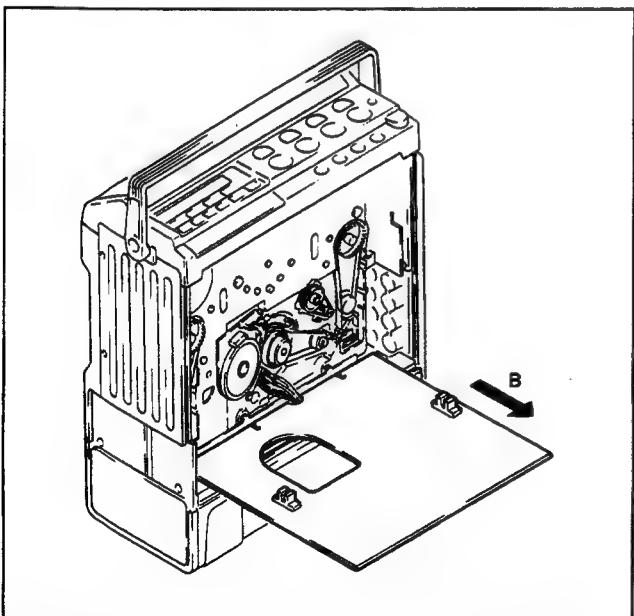
### 1-10-2. SST-1 Board

NOTE : Adjustment data is memorized in IC520 (address P-10). When replacing SST-1 board, remove IC520 from old PC board and mount it to new SST-1 Board.

- (1) Open VRP-1 Board referring to section 1-10-1.
- (2) Remove the five screws and open SST-1 board in the direction of arrow A. Do not loosen screws marked with \* because the bracket is installed behind the PC board.



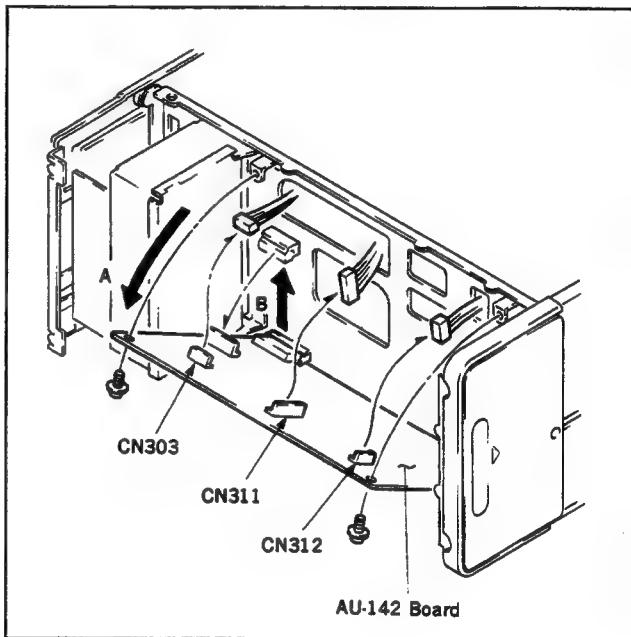
- (3) When removing, pull SST-1 Board in the direction of arrow B.



- (4) When install the SST-1 Board, check that the five connectors are connected securly.

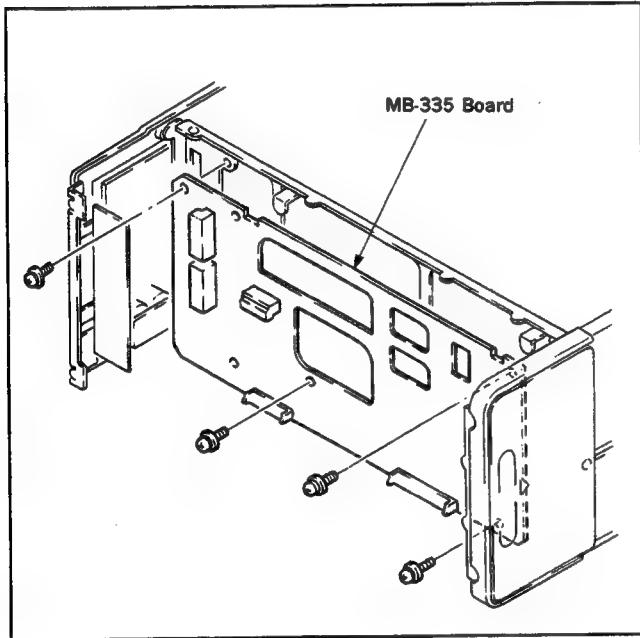
### 1-10-3. AU-142 Board

- (1) Remove the Rear Panel Block form the unit referring to section 1-8.
- (2) Disconnect CN311, CN312 and CN303 from AU-142 Board.
- (3) Remove the two screws and open AU-142 Board in the direction of arrow A.
- (4) When removing, pull AU-142 Board in the direction of arrow B.
- (5) When installing, connect the connectors between AU-142 Board and MB-335 Board securely.



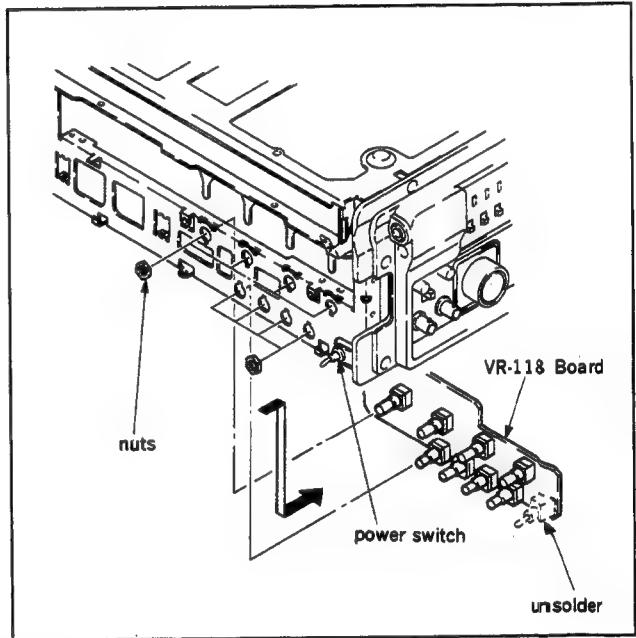
#### 1-10-4. MB-335 Board

- (1) Remove SST-1 Board referring to section 1-10-2.
- (2) Remove the Rear Panel Block referring to section 1-8.
- (3) Remove the Power Supply Block referring to section 1-11.
- (4) Remove AU-142 Board referring to section 1-10-3.
- (5) Disconnect all connectors which is connected to the MB-335 Board.
- (6) Remove the four screws and remove MB-335 Board.



#### 1-10-5. VR-118 Board

- (1) Remove the Front Panel referring to section 1-8.
- (2) Loosen the three screws and disconnect CN503, CN504 and CN505 on KY-207 Board. Remove KY-207 Board from the chassis.
- (3) Open SST-1 Board referring to section 1-10-2.
- (4) Remove the eight nuts of volumes.
- (5) Unsolder of the power switch.
- (6) Disconnect CN551, CN552, CN553, CN554, CN555, CN556 and CN557 on VR-118 Board. Pull VR-118 Board in the direction of the arrow and remove it from the unit.



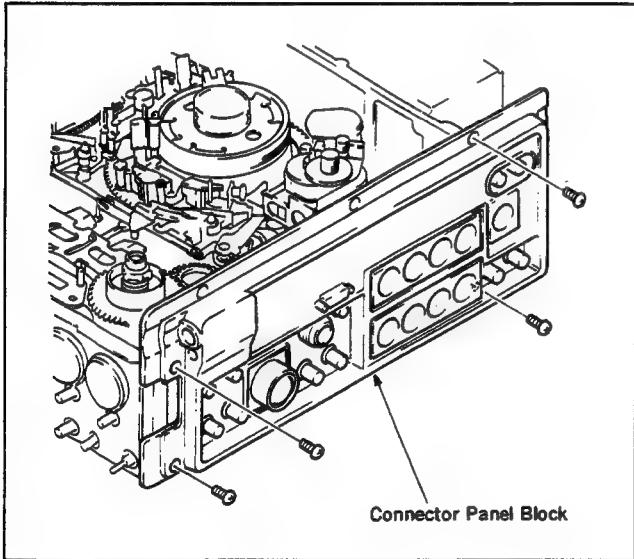
(7) After replacement, solder the power switch.

#### 1-10-6. PC Boards of Connector Panel Block

(CP-164, CC-47)

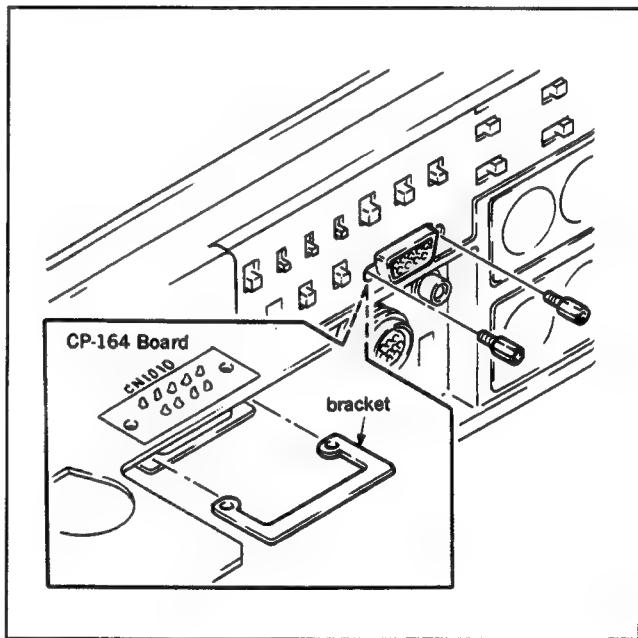
\* Removal of connector panel block

- (1) Remove the Top Panel, Front Panel and Rear Panel block referring to section 1-8.
- (2) Remove the Cassette Compartment Block referring to section 1-9.
- (3) Remove the two fixing screws and remove the Handle Ass'y.
- (4) Open VRP-1 Board referring to section 1-10-1 and disconnect CC-47 Board and VRP-1 Board (CN1, CN2 and CN3).
- (5) Remove the four screws as shown in the figure.
- (6) Disconnect the faston terminal and CN601 from the PC Board of the Power Supply Block.
- (7) Disconnect the faston terminal from FU-52 Board.
- (8) Disconnect CN924, CN925, CN926, CN927, CN928 and CN929 on MB-335 Board.
- (9) Disconnect CN555 and CN556 on VR-118 Board.
- (10) Remove the Connector Panel Block from the unit and replace each board as follows.



##### 1. CP-164 Board

- (1) Remove the two bolts of remote connector from the outside of the Connector Panel. At this time, the bracket is removed together, do not lose it.
- (2) Disconnect CN408 on CP-164 Board and CN7 on CC-47 Board.
- (3) Disconnect CN404, CN405, CN406, CN407, CN409, CN412, CN413, CN416 and CN417 on CP-164 Board. Remove the nine screws and remove CP-164 Board from the Connector Panel Block.
- (4) When installing CP-164 Board, place the bracket of remote connector between PC Board and connector, fix them with bolts from the outside of the Connector Panel.

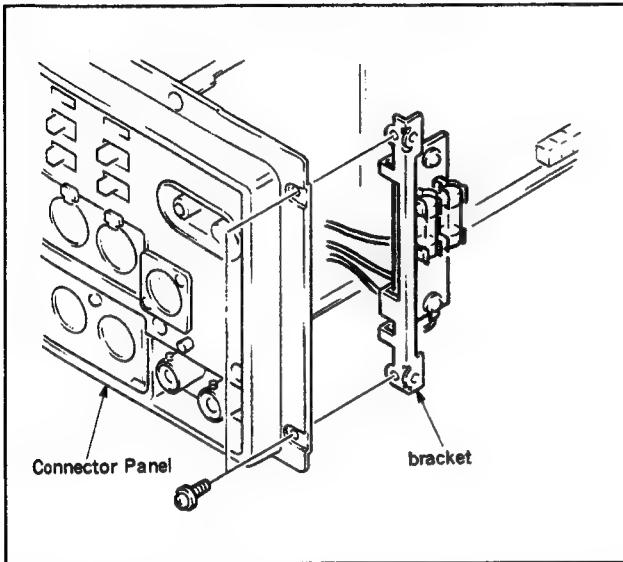


##### 2. CC-47 Board

- (1) Disconnect CN4, CN5 and CN7 on CC-47 Board.
- (2) Remove the knobs and nuts of MONITOR and VIDEO LEVEL volumes from the outside of the Connector Panel.
- (3) Unsolder the eight solders of BNC connectors.
- (4) Remove CC-47 Board from the chassis.

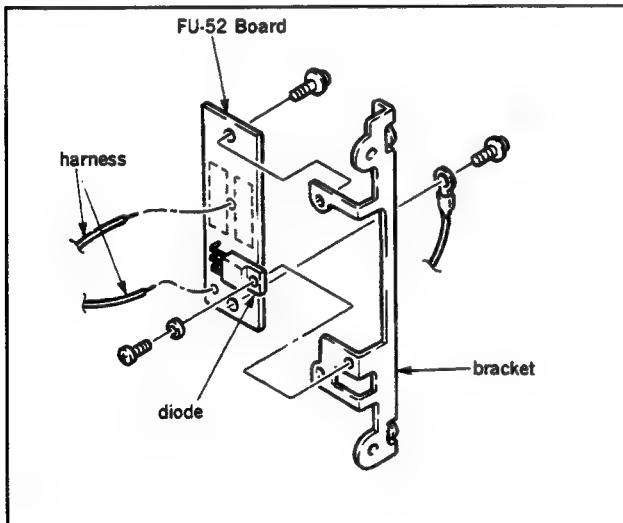
#### 1-10-7. FU-52 Board

- (1) Remove the Power Supply Block referring to section 1-11.
- (2) Remove the two screws of the bracket.



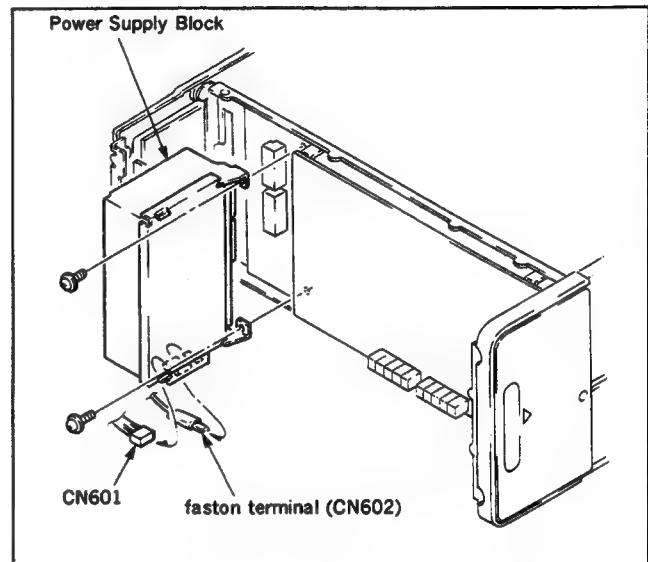
- (3) Unsolder the harness and remove the fixing screw of the diode.
- (4) Remove the two screws and remove FU-52 Board from the bracket.

NOTE : For replacement procedure of fuse, refer to section 1-14-2.



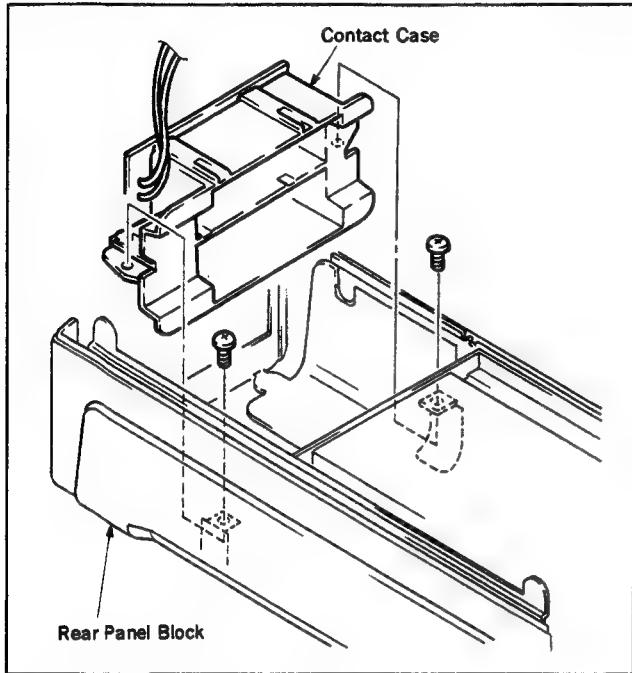
#### 1-11. REMOVAL OF POWER SUPPLY BLOCK

- (1) Remove the Rear Panel Block referring to section 1-8.
- (2) Remove the two screws as shown in the figure.
- (3) Disconnect CN601 and faston terminal (CN602) from PC Board of the Power Supply Block.
- (4) Remove the Power Supply Block.

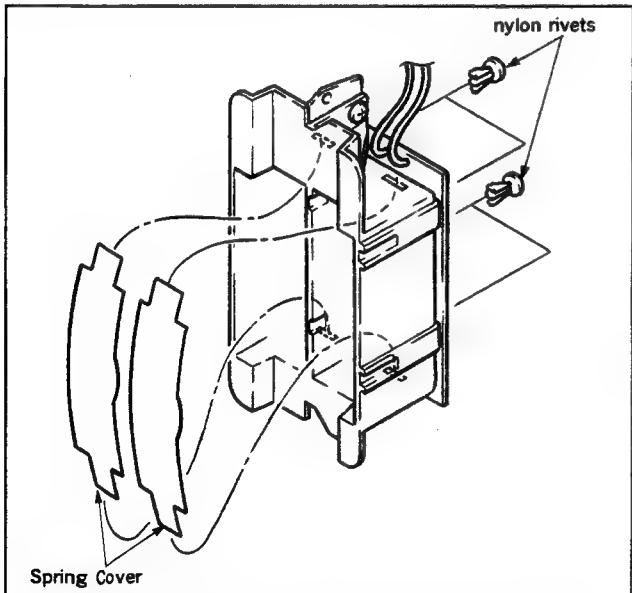


## 1-12. REPLACEMENT OF BATTERY TERMINALS

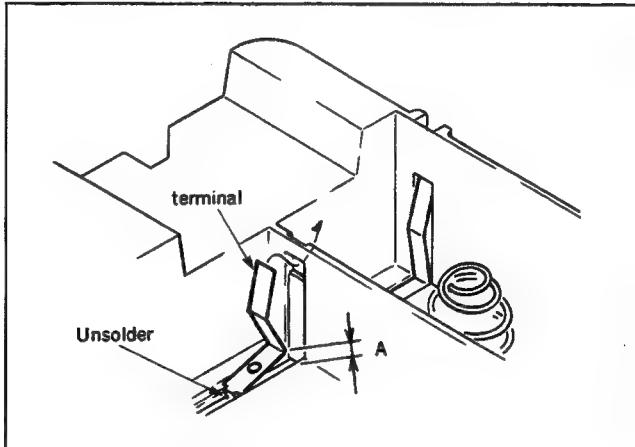
- (1) Remove the Rear Panel Block referring to section 1-8.
- (2) Remove the two screws and remove the Contact Case.



- (3) Remove the Spring Covers.
- (4) Remove the four nylon rivets.



- (5) Unsolder the four solders and replace the terminals as shown in the figure. When installing the terminals, check that there is no clearance at A position.



## 1-13. SERVICE PARTS

### 1. Safety Related Components Warning

Components marked with  $\Delta$  on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

### 2. Standardization of Parts

Repair parts supplied from Sony Parts Center may not always be identical with the parts actually in use due to 'accommodating the improved parts and/or engineering changes' or 'standardization of genuine parts'. This manual's exploded views and electrical spare parts list indicate the part numbers of 'the standardized genuine parts at present'.

### 3. Change of Parts

Regarding engineering parts changes, refer to Sec.14 CHANGED PARTS.

### 4. Stock of Parts

Parts marked with 'o' SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with 'o' will be processed, but allow for additional delivery time.

### 5. Units for Capacitors and Resistors

The following units may be assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

capacitors :  $\mu\text{F}$

resistors :  $\Omega$



## 1-14. NOTES ON REPAIR PARTS

### 1-14-1. Replacement Procedure for Chip Parts

Tools:

- soldering iron 20W ;  
If possible, use a soldering iron tip heat-controller at  $270 \pm 10^\circ\text{C}$ .
- braided wire  
SOLDER TAUL or equivalent  
Sony parts No. 7-641-300-81
- solder ;  
0.6 mm dia. is recommended.
- tweezers

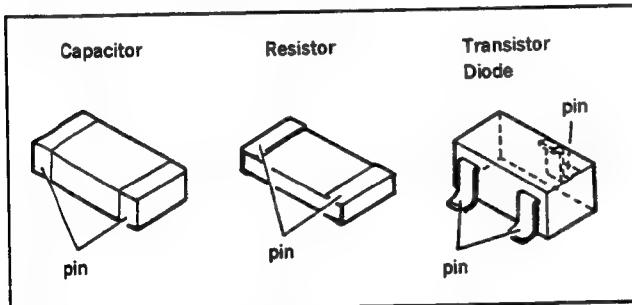
Soldering conditions

soldering iron temperature ;

$270 \pm 10^\circ\text{C}$

soldering time ;

less than two seconds per a pin



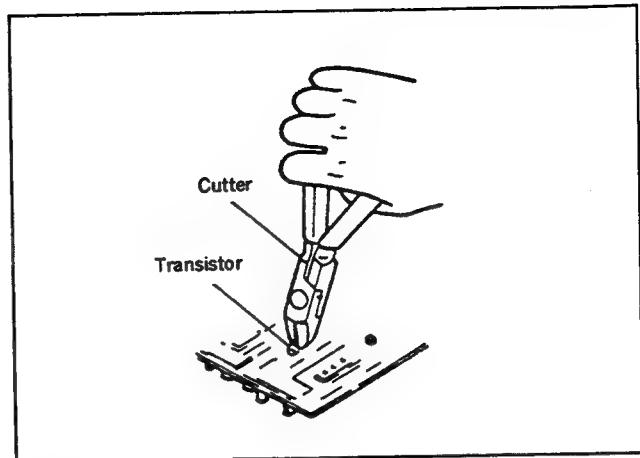
#### Resistor and Capacitor replacement

- (1) Place the soldering iron tip onto the chip part and heat it up until the solder is melted. When the solder is melted, slide the chip part aside.
- (2) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
- (3) After removing the chip part, presolder the area where the new chip part is to be placed, with a thin layer of solder.
- (4) Place new chip part on the desired position and solder both ends.

NOTE : Once a chip part has been removed, never use it again.

#### Transistor and Diode Replacement

- (1) Cut the terminals of the chip part with cutters.
- (2) Remove the cut leads.
- (3) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
- (4) After removing the chip part, presolder the area where the new chip part is to be placed, with a thin layer of solder.
- (5) Place new chip part on the desired position and solder the terminals.



#### IC Replacement

- (1) Using the braided wire, SOLDER TAUL Sony Parts No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
- (2) While heating up the pins, remove the pins one by one using sharp-pointed tweezers.
- (3) Check that there is no pattern peeling, damage and/or bridges around the unsoldering positions.
- (4) After removing the chip part, presolder the area, where the new chip part is to be placed, with a thin layer of solder.
- (5) Place new chip part in the desired position and solder the pins.

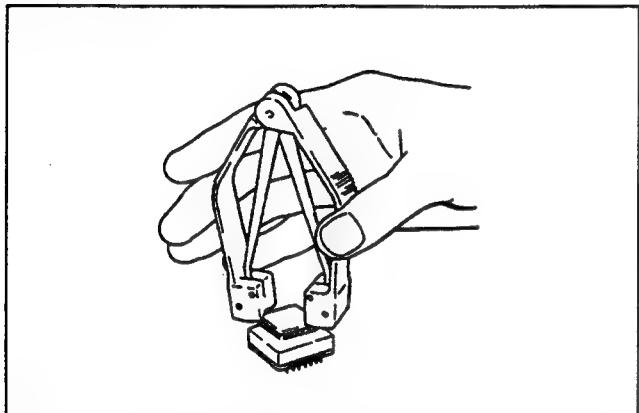
### 1-14-2. Replacement of Fuse

Power fuse is mounted on the FU-52 Board. When replacing the fuse, remove the foreign material (screw etc.) which causes blowing from unit.

- (1) Remove the Rear Panel Block referring to section 1-7.
- (2) Remove the fuse from the fuse holder and replace it with a new one.

### 1-14-3. Extraction Tool (for PLCC socket)

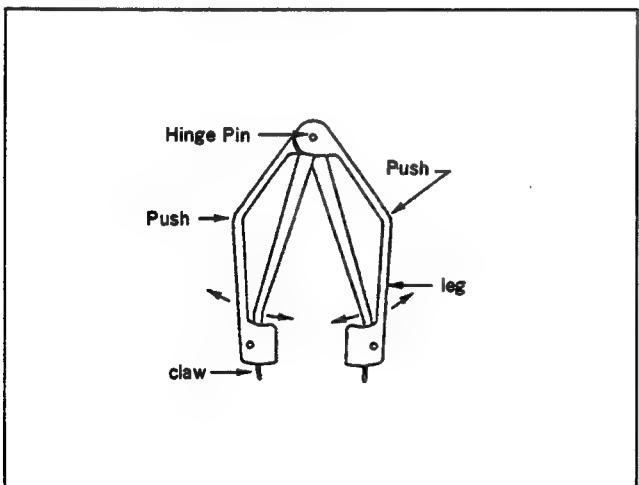
The Extraction Tool is convenient for extracting an integrated circuit of type PLCC and fits all types of ICs from 20 through 124 pins.



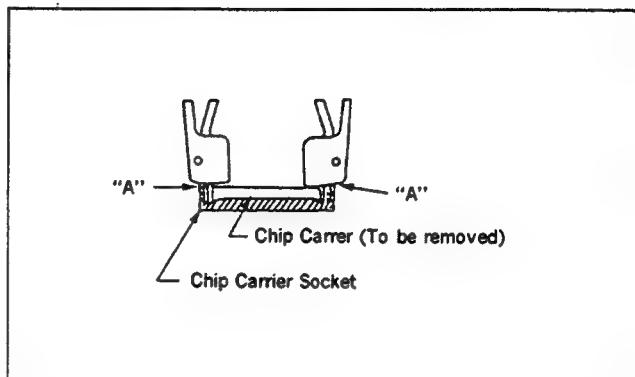
**NOTE:** Never pull chips of an integrated circuit upward with the Extraction Tool. Never hold the Extraction Tool on a strong force.

#### How to use the Extraction Tool

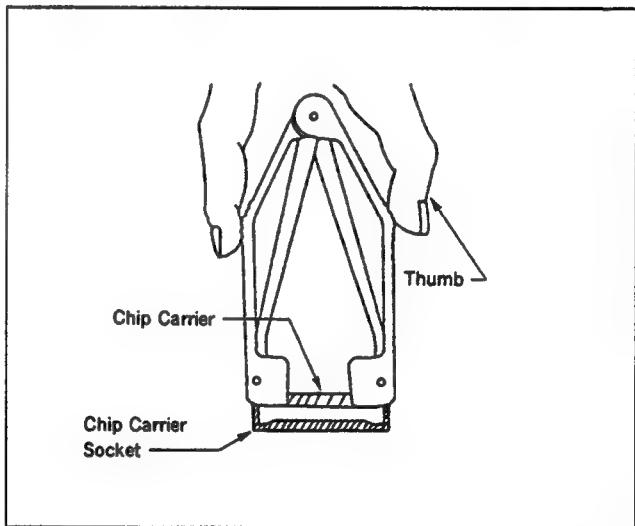
- (1) Adjust width so that claws of tool are matched to a socket of an integrated circuit.



- (2) Insert claws of the tool into slots of the socket, and then press the tool against the socket so that the A marked portions of the tool contact to the socket.



- (3) Hold the tool with your finger as shown in figure. The socket is pressed on a little force to downward.



- (4) When pinching the tool in fingers, the legs of the tool are straightened. At that time, the claws pinch the chips of the integrated circuit and pull the integrated circuit upward.
- (5) After pulling the integrated circuit, loosen the force of the fingers. It is easy that the chips of the integrated circuit is extracted from the tool.

### 1-15. SETTING FOR SYSTEM SWITCH

The switches in the TC Panel can set and check the system setup etc.

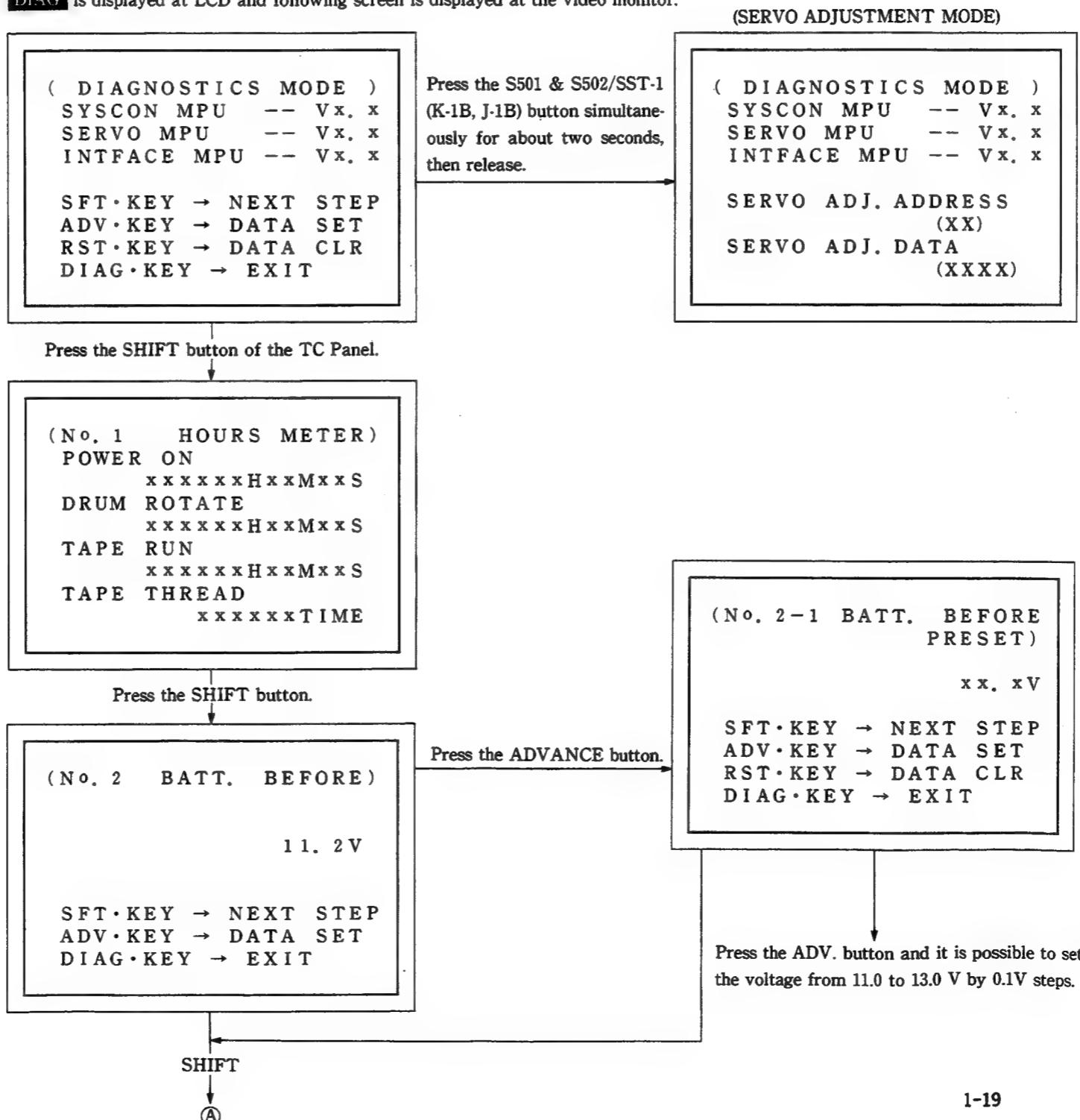
Preparation : Set the switch of Connector Panel without a cassette tape inserting.

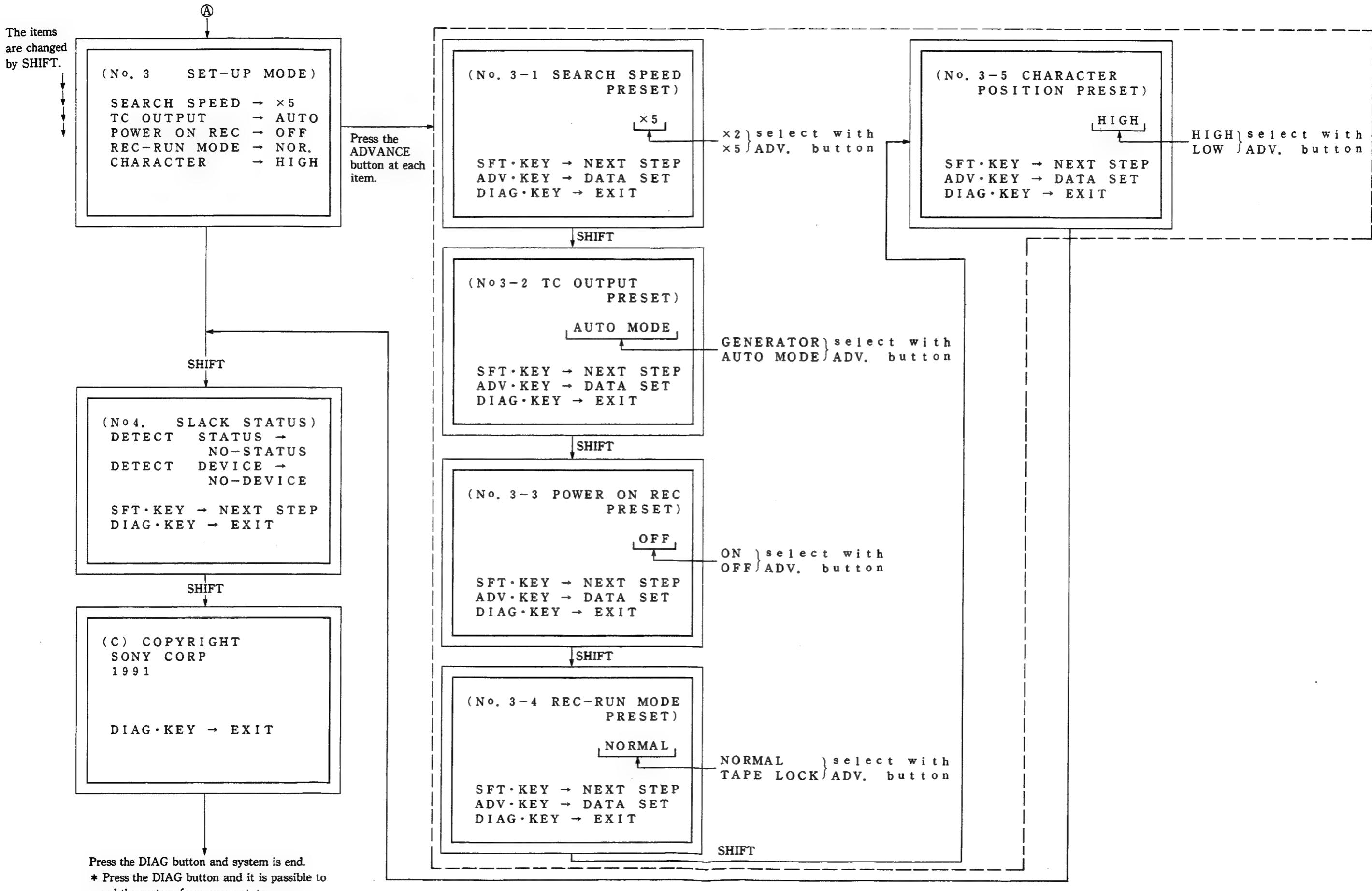
- . MODE SW : FEEDER (PB or PB. EE)
- . Connect the video monitor to VIDEO OUT 2.

Connect the Power Source and turn the power ON.

Push the **DIAG** button of the TC Panel with a something tapering.

**DIAG** is displayed at LCD and following screen is displayed at the video monitor.

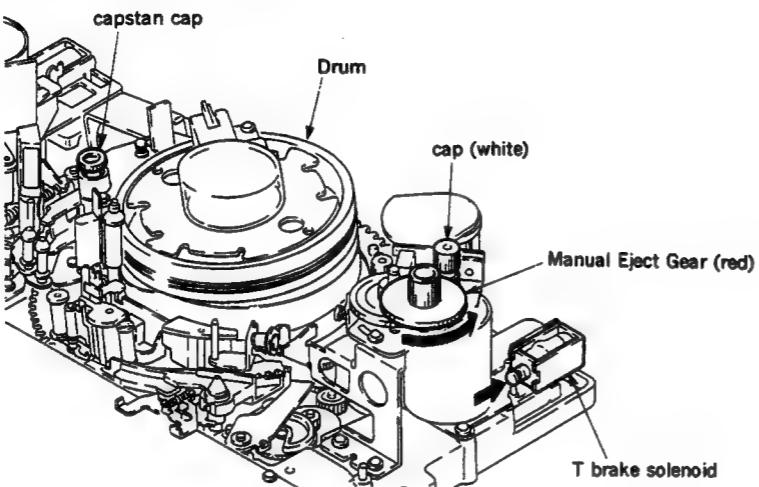




## 1-16. MANUAL EJECT PROCEDURE FOR TAPE SLACK

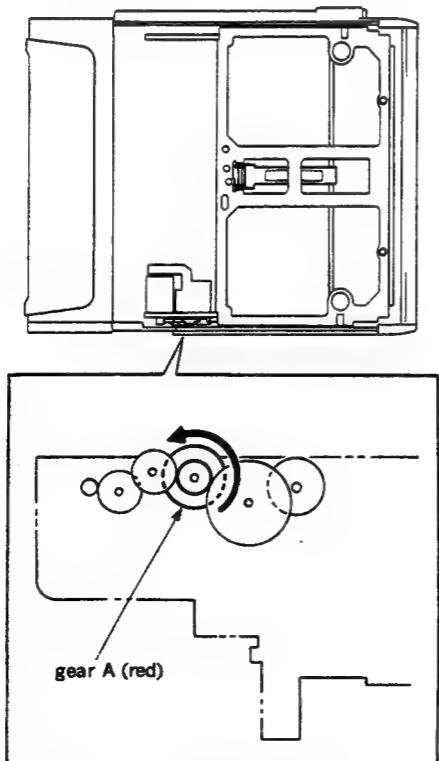
If either the cassette cannot be ejected or the Cassette Compartment does not rise up due to a defect, perform the following procedures to eject the cassette.

- (1) Remove the Top Panel referring to section 1-7.
- (2) While releasing the T Brake by pushing the solenoid in the direction of the arrow and turn the Manual Eject Gear (red) in the direction of the arrow. Wind up the tape in the cassette.



- (3) When the tape slacks, while releasing the T Brake, turn the cap (white) of T Reel Motor in the clockwise.
- (4) Turn the gear A (red) in the direction of the arrow. The cassette compartment is up and eject the cassette tape. At this time, open the front cover and it is easy to turn the gear.

NOTE: When the tape winds around the capstan shaft, turn the capstan cap and remove the tape from the shaft before performing the step (2).



## 1-17. TAPE PROTECTION

The unit has various detection circuits for tape protection. These detection circuits are described below.

- (1) During Threading  
When the unit is put into the following states during the Threading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Threading operation stops.
  - When UNTHREAD END SW does not turn OFF after 6 seconds from starting the drive of the threading motor.
  - When THREAD END SW does not turn ON after 6 seconds from starting the drive of the threading motor.
  - When the drum rotation stops during threading and the DRUM ROTATE signal does not be generated.
- (2) During F.FWD, FWD SEARCH  
When the unit is put into the following states during the F.FWD or FWD SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and F.FWD or FWD SEARCH operation stops.
  - When T Reel Table rotation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- (3) During REW, REV SEARCH  
When the unit is put into the following states during the REW, REV SEARCH Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REW, or REV SEARCH operation stops.
  - When S Reel Table rotation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- (4) During PLAY  
When the unit is put into the following states during the PLAY Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY operation stops.
  - When T Reel Table rotation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
  - When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.
- (5) During STOP STANDBY ON  
When the unit is put into the following states during the STOP STANDBY ON Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and STOP STANDBY ON operation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
  - When the capstan rotation stops and the CAPSTAN ROTATE signal does not be generated.
- (6) During PLAY PAUSE  
When the unit is put into the following state during the PLAY PAUSE mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and PLAY PAUSE operation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- (7) During REC PAUSE  
When the unit is put into the following state during the REC PAUSE Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and REC PAUSE operation stops.
  - When the drum rotation stops and the DRUM ROTATE signal does not be generated.
- (8) During Unthreading  
When the unit is put into the following states during the Unthreading Mode, the protection circuit operates as if the tape slack happened. The slack lamp lights and Unthreading operation stops.
  - When T Reel Table rotation stops.
  - When the UNTHREAD END SW does not turn ON after 6 seconds from starting the drive of the unthreading motor.
- (9) During change from each mode to STOP Mode  
When changing from each mode to STOP Mode, the tape is reversed. When the unit is put into the following state during this time, the protection circuit operates as if the tape slack happened. The slack lamp lights and tape reverse operation stops.
  - When the REVERSE STATUS signal of the capstan does not be generated.
- (10) When turning the power switch ON (When the unit is not in the tape end state in the threading completion mode.)  
When turning the power ON, the unit is put into the following states, the protection circuit operates as if the tape slack happened. The slack lamp lights and changing to the STOP Mode operation stops.
  - When the drum rotation stops and DRUM ROTATE signal does not be generated.
  - When the REVERSE STATUS signal of the capstan does not be generated.
- (11) When inserting the cassette or turning power ON with cassette in, the reel rotates for winding the tape slack.  
When the reel rotation does not stop after 3 seconds, the protection circuit operates as if the tape is cut. The slack lamp lights and reel rotation stops.

## 1-18. SELF DIAGNOSTICS

When the power source is connected, perform the check of peripheral circuit around the system control MPU in spite of power SW state.

Correct operation case : The check is end without display. (Checking time ; 0.5 to 1 second)

Incorrect operation case : The defective point (s) is decided by assortment of indicator as described below.

(Each indicator blinks in 4 Hz.)

INDICATION ASSORTED		PRESUMPTIVE DEFECTIVE POINT (SST-1 BOARD)
WARNING	REC	RAM of MAIN MPU (IC6)
	RLAY	ROM of MAIN MPU (IC6)
EJECT	REW	IC213 (INTERFACE), IC214 (TC) and these connections.
	FF	P62 (53pin) of IC6 (MAIN)
	SEARCH	P10-IC6 (3pin), P10-IC213 (37pin)
	DUB	P70-IC213 (3pin), P71-IC213 (2pin), P72-IC213 (1pin), P73-IC213 (44pin)
	PAUSE	P60-IC213 (7pin), P61-IC213 (6pin), P62-IC213 (5pin), P63-IC213 (4pin)

NOTE : How to View the Assortment of Indicator

Ex. Three indicators (WARNING-EJECT-REW) blink.

\* Except for above diagnostics functions, LEDs are mounted near the three MPU (SYSCON-MAIN, INTERFACE and SERVO MAIN), and it is possible to check the function of MPU by blinking of them.

• blinking every one second for 30 mS --- correct

• blinking every half second --- incorrect

## 1-19. REPLACEMENT OF LITHIUM BATTERY ON SST-1 BOARD

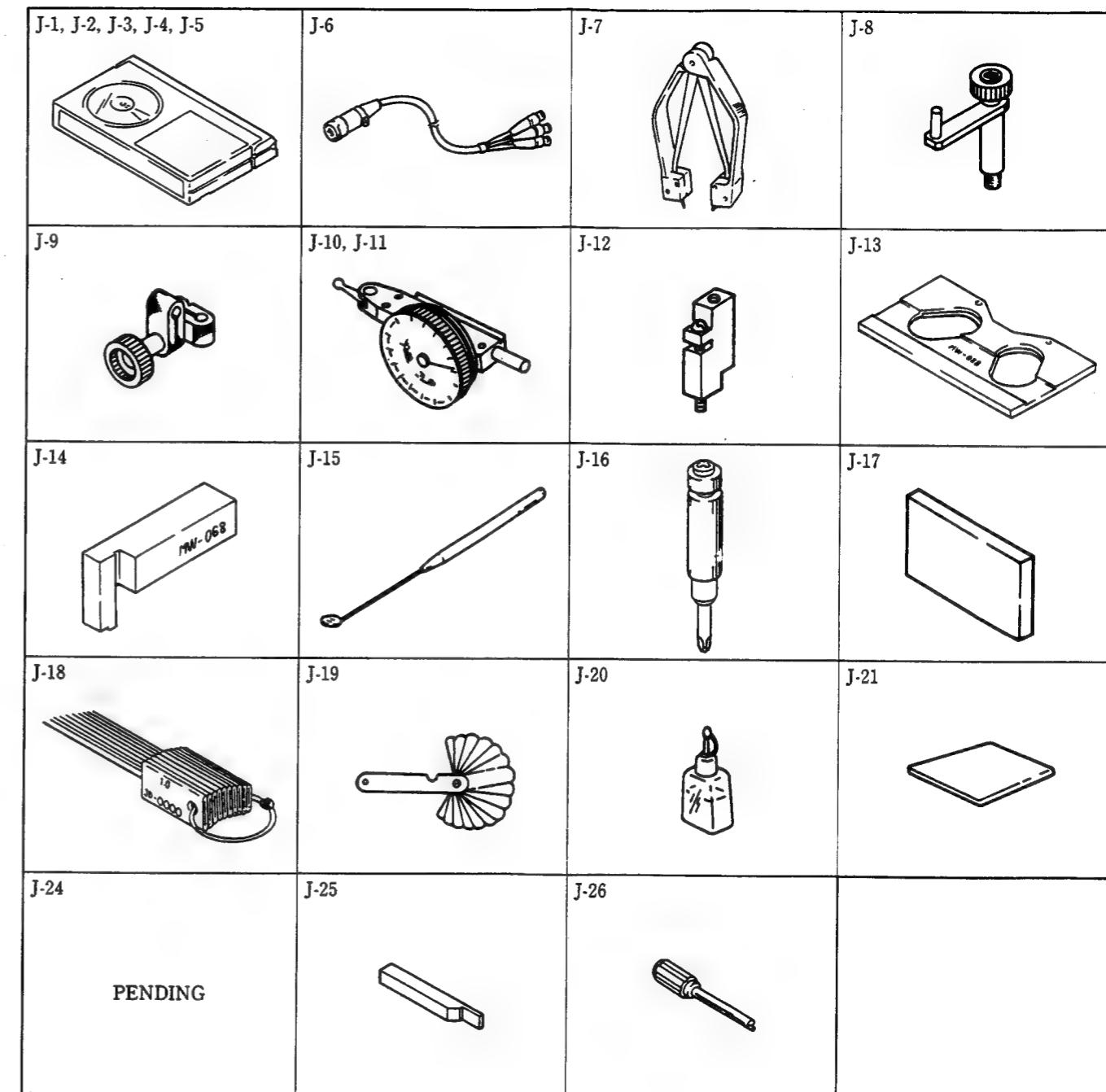
There is a lithium battery on SST-1 Board for back up memory of hours meter and time code.

The life of the battery depends on the condition of use, replace the battery every two years as a standard.

- (1) Display the hours meter referring to section 2-2-1, and write down the data of hours meter.
- (2) Turn the power off and disconnect the external power source and remove the battery pack.
- (3) Remove the VRP-1 Board referring to section 1-10-1.
- (4) Open the SST-1 Board referring to section 1-10-2.
- (5) Connect the external power source or insert the battery pack.
- (6) Check that some figure or character is displayed on the display window.
- (7) Take a caution not to touch the other parts and unsolder the slit (SL200) and open it.
- (8) Take a caution not to touch the other parts and replace the lithium battery.
- (9) Solder the slit (SL200) and short it.
- (10) Disconnect the external power source and remove the battery pack.
- (11) Close the SST-1 Board. Check that the five connectors are connected securely.
- (12) Install the VRP-1 Board referring to section 1-10-1.
- (13) Connect the external power source or insert the battery pack.
- (14) Display the hours meter referring to section 2-1-1. Check that the data is the same as written down one.

**1-20. FIXTURE**

Ref. No.	Parts No.	Description	Application
J-1	8-960-096-51	Alignment Tape, CR2-1B PS	Video tracking adjustment for recorder
J-2	8-960-096-91	Alignment Tape, CR5-1B PS	Video system adjustment (metal tape)
J-3	8-960-096-86	Alignment Tape, CR8-1B PS	Audio system adjustment (metal tape)
J-4	8-960-098-44	Alignment Tape, CR5-2A PS	Video system, servo system adjustment (oxide tape)
J-5	8-960-098-45	Alignment Tape, CR8-1A PS	Audio system adjustment (oxide tape)
J-6	J-6031-830-A J-6031-840-B	Multi Connector Cable (DOBNC) Multi Connector Cable (CIBNC)	Video system adjustment
J-7	J-6035-070-A	Extraction Tool (for PLCC socket)	Extraction of integrated circuit of type PLCC
J-8	J-6001-820-A	Upper Drum Eccentricity Adjustment Tool (3)	Upper drum eccentricity adjustment
J-9	J-6001-830-A	Upper Drum Eccentricity Adjustment Tool (2)	Upper drum eccentricity adjustment
J-10	J-6001-840-A	Upper Drum Eccentricity Adjustment Tool (1)	Upper drum eccentricity adjustment
J-11	J-6325-530-A	Upper Drum Eccentricity Adjustment Tool (6)	Upper drum eccentricity adjustment
J-12	J-6087-000-A	Upper Drum Eccentricity Adjustment Tool (5)	Upper drum eccentricity adjustment
J-13	J-6326-530-A	Cassette Reference Plate (L)	Reel table height adjustment
J-14	J-6326-750-A	Reel Table Height Gauge	Reel table height adjustment
J-15	J-6080-840-A	Small Mirror	Tape path adjustment
J-16	J-6321-500-A	Tape Guide Adjustment Driver	Tape guide height adjustment
J-17	J-6086-570-A	Reference Flat Plate	Audio/TC head zenith adjustment
J-18	J-6152-450-A	Wire Clearance Gauge Set	Clearance check
J-19	9-911-053-00	Thickness Gauge	Clearance check
J-20	9-919-573-01	Cleaning Fluid	Cleaning
J-21	2-034-697-00	Cleaning Piece	Cleaning
J-22	Standard Products	Head Demagnetizer (HE-4)	Head demagnetizing
J-23	Standard Products	Tentel Meter (T2-H7-UMC)	Back tension adjustment
J-24	J-6036-870-A	Tension Regulator Adjustment Tool	Tension regulator adjustment
J-25	J-6190-800-A	Tension Regulator Vertical Check Tool	Tension regulator slant check
J-26	3-702-390-01	Dihedral screwdriver (4φ)	TC Head Position Adjustment





## 1-21. An Overview of Theory of Operation

### 1. GENERAL DESCRIPTION

The BVW-50 Video Cassette Recorder has four recording and four playback heads on a rotating drum for luminance and chrominance signals separately.

Channel A/B playback head signal switching is performed on the rotating drum enabling the use of a six channel rotary transformer to couple the head signals between the rotating and stationary drum.

Printed circuit boards are described in section 1-6 and the wiring schematic between printed circuit boards and other components is shown in Fig. 1-21-1. The wiring connections between printed circuit boards are mainly done by MB-335 mother board except some conventional cable wire harness. The LNG audio recording and playback heads, CONFI, CTL, TC and the full erase heads are stationary.

### 2. AUDIO SYSTEM

The AU-142 board contains the main part of recording, playback and control circuits for LNG audio and AFM. The rerecording and playback level controls and the level meter circuits on VR-118 board, a part of level meter and its driving circuit on KY-207 board and input/output connectors and their associated circuits on CP-164 board constitute the rest of the audio system.

- (1) REC mode In the REC mode, the signals from the CAMERA IN and AUDIO IN connectors are supplied to CP-164 board. One signal source of CAMERA or LINE is selected and the signal levels of -60, -20 or +4 dB are also selected in the board. The switching which signals from the CH-3/CH-4 or CH-1/CH-2 connectors input to the AFM is also performed in CP-164 board.

When the AUDIO SELECT switch on the front panel is set to MANUAL the levels of the CH-1/CH-2 signals are adjusted by the REC LEVEL VR on VR-118 board. After the level adjustment, CH-1/CH-2 LNG audio signals input to the AU-142 board and are then encoded in the noise reduction circuit and supplied to the equalizing circuit to drive the recording heads through recording amplifiers. When AUTO is selected by the AUDIO SELECT switch, the levels of the CH-1/CH-2 signals are adjusted automatically by the AGC/Limiter on the VR-118 board. The CH-1/CH-2 LNG audio signals then go to the AU-142 board as in the case of the MANUAL.

The high frequency bias for the LNG audio and audio erase, utilize the same reference crystal oscillator preventing harmful beat noise in the system.

In the case of the AFM, the levels of the CH-3/CH-4 signals are adjusted by the REC LEVEL VR in the VR-118 board irrelevant to the AUDIO SELECT switch position. After the level adjustment the CH-3/CH-4 audio signals input to the AU-142 board and are then encoded

in the noise reduction circuit and supplied to a limiter to modulate the frequency of two different RF carriers, 310kHz for CH-3 and 540kHz for CH-4. The RFs of CH-3/CH-4 are then mixed and supplied to the chroma recording amplifiers in VRP-1 board.

- (2) PB mode In the playback mode, LNG audio signals go through the playback equalizing circuit in the AU-142 board and are then decoded in a noise reduction circuit on the same board. Since the AFM signal is played back with the chroma signal, the latter is removed by a low pass filter in the AU-142 board. The AFM RF signal which undergoes level regulation in the AGC circuit is separated into CH-3 and CH-4 RF carrier by bandpass filters and then supplied to each FM demodulator. After decoding in the noise reduction circuit, the AFM audio signals are PB level controlled in the VR-118 board along with the LNG audio signals.

Then the signals go through the output circuit of the CP-164 board and the LNG audio signals output to the AUDIO OUT 1 and 2 connectors whereas the AFM audios output to the AUDIO OUT 3 and 4 connectors. Stereophonic sound is employed in the HEAD/EAR PHONES OUTPUT. A switch which selects CH-1/CH-2, CH-3/CH-4 or a mix of CH-1 to CH-4 for the HEAD/EAR PHONES OUTPUT is provided on the connector panel.

### 3. VIDEO SYSTEM

The video system mainly consists of the VRP-1 and TBC-19 boards. In addition, CC-47 board is used for video I/O circuit and a part of KY-207 board is utilized for video/audio meter switching.

- (1) VRP-1 board The recording and playback circuits of the video signal are mounted on the VRP-1 board. In the REC mode, the signals from the CAMERA IN and LINE IN connectors are supplied to the CC-47 board. One signal source of CAMERA or LINE is selected and then REC SYNC signal is separated. The SELECT VIDEO COMPOSITE and COMPONENT signals are supplied to the VRP-1 board and are A/D converted to 8bit digital signals except the component Y signal. The composite signal is Y/C separated by 3-line correlation utilizing 2 stage FIFO (First In First Out) memory having 910 words x 8bits structure each. The separated digital Y signal is D/A converted to an analog Y signal. One of the separated analog Y or component Y signal is selected and goes through a slew rate limiter to modulate the frequency of Y carrier RF. The modulated Y carrier RF is finally recorded on a magnetic tape through the recording amplifiers, a rotary transformer and  $Y_A/Y_B$  recording heads.

The decoded B-Y and R-Y signals from the composite or

the component input B-Y and R-Y signals are compressed into a CTDM (Compressed Time Division Multiplex) chroma signal which is one channel signal with B-Y and R-Y separated along time axis. The CTDM chroma signal is obtained by writing B-Y and R-Y signals into memories by a clock synchronized to the input sync and then reading them out by a clock which has two times higher frequency than that used in writing.

The CTDM chroma signal also modulates the frequency of C carrier RF.

The modulated C carrier RF is frequency multiplexed with the AFM and finally recorded on a magnetic tape through the recording amplifiers, the rotary transformer and  $C_A/C_B$  recording heads.

In the Playback mode, signals from the  $Y_A/Y_B$  PB heads are amplified and switched by CH-A and CH-B in the PA-119 Board on the rotating drum, thus making PB RF Y signal. It then goes through the rotary transformer and is supplied to RF processor in the VRP-1 board.

In the processor cosine equalization, AGC (Automatic Gain Control) and DO Det (Drop Out Detection) are performed on the PB RF Y signal and the resultant output goes to a demodulator where the loss of higher frequency component caused by over modulation is compensated for by an OMC (Over Modulation Compensator). The signal is frequency demodulated and then goes to a non-linear de-emphasis circuit to become demod Y signal which outputs to TBC-19 board.

The signals from the  $C_A/C_B$  PB heads are processed almost in the same way as the Y signal and make demod C signal which also outputs to the TBC-19 board.

Reproduced composite and component signals from the TBC-19 board return to the VRP-1 board. One composite signal is amplified and goes through CC-47 board and outputs to the VIDEO OUT 1 connector. Another composite signal is mixed with character superimpose signal, amplified and outputs to the VIDEO OUT 2 connector. Component signals are switched DUB Y/TBC Y, Y-DO/TBC R-Y, C-DO/TBC B-Y, and DUB CTDM/GND by the L: CTDM DUB signal, go through the CC-47 board and output to the DUB/COMPONENT OUT (12 pins) connector.

(2) TBC-19 board     The time base correctors for the Y and C signals are provided on the TBC-19 board.

The demod Y and demod C signals from the VRP-1 Board are A/D converted to 8bit digital signals and written into two  $4 \times 960 \times 306$  bit memories respectively. The write clock is generated from sync signal derived from the demod Y or demod C respectively before A/D conversion.

On the other hand, read out clock of the memories is synchronized to the reference video sync. Thus, even if the played back video signals from the PB heads contain jitter and phase variations, you will be able to get stable

video signals synchronized to the reference after time base correction. After processing dropout and edge noise the read out Y signal from the memories is D/A converted to an analog signal. This analog Y signal with sync added makes up the TBC Y signal and is supplied to the VRP-1 board.

When the CTDM chroma signal is read out from the memory, it is expanded two times longer in time axis. Drop outs in the signals are compensated and consequently, separate B-Y and R-Y signals are obtained and are D/A converted to two channel analog signals.

Time delay of chroma signal caused by Y/C separation and CTDM is compensated for by advancing read out timing from that of the Y signal.

The converted analog B-Y and R-Y signals go through clamp circuits and output to the VRP-1 board separately as component signals.

At the same time, the analog B-Y and R-Y signals respectively modulate U/V axis subcarriers which are derived from either an external or internal subcarrier. The modulated subcarriers are mixed to make the chroma signal and then encoded in the PAL format with Y signal and output to the VIDEO OUT 1 and 2 connector through the VRP-1 board.

#### 4. SERVO SYSTEM

The servo system is composed of the drum, capstan and reel servos.

The inputs and outputs of these servos are handled by a newly developed servo IC, CXD 2202. This servo IC is controlled by a 16bits internal, 8bits external CPU, thus closing the servo loops. The servo IC, CPU and associated circuits are mounted on SST-1 board together with the SYSTEM CONTROL circuits.

Pulse signals such as capstan and threading FG's, drum PG, PB SYNC and ENCODE SYNC are supplied to the FRC(Free Running Counter) inputs of the servo IC after processing noise component. These signals are then written into FIFO (First In First Out) buffers attached with time of occurrence for each pulse.

The CPU then reads out from the FIFO in time sequence. The output of the S reel and T reel FG, the capstan FG and CTL signals are supplied to the counter input of the servo IC. To the input ports of the servo IC, discretes such as thread end, un-thread end, large/small cassette and metal/oxide tape detection are applied.

The servo IC generates output pulse signals such as Y SWP, C SWP,  $Y_{A,B}$  REC,  $C_{A,B}$  REC, PWM (Pulse Width Modulation) signals to control the drum, capstan, threading, S reel and T reel motors and drives the plungers of PINCH, S BRAKE and T BRAKE.

The tension of the magnetic tape is controlled by applying control torques to the S reel motor. The control torques are derived from tension sensor analog signal which is taken into



the tension control loop by an A/D converter on the CPU. The execution program of the CPU is stored in a 64k bytes ROM. The CPU has a 2k bytes RAM and a nonvolatile RAM for holding automatic adjustment parameters. In addition, the CPU has a 4 bit microcomputer connected to its I/O port for communicating with the SYSTEM CONTROL CPU. For the automatic adjustment of the capstan and tension servos, an 8 bit D/A converter is provided which receives adjustment signals from the CPU through serial communication port and outputs the signals to the inputs of these servos.

## 5. SYSTEM CONTROL

The mechanical, electrical, parameter setting and failure diagnosis systems are managed by the SYSTEM CONTROL. As long as electric power is connected to the Recorder, the SYSTEM CONTROL is performing its function even while the power switch is off consuming very low power. The LCD display, control switches such as PLAY, REC, FF, REW etc. and their LED lamps on the front panel are installed on the KY-207 board. The on/off states of these switches are dynamically scanned and are taken into the system control 16bit microcomputer on the SST-1 board.

This microcomputer has a 32k byte ROM and a 1k byte RAM and is connected to the tape beginning/end sensor, condensation sensor, power switch and DC-DC ON discretes and character generator for super impose through I/O ports and I/O expander. The microcomputer is also connected to the time code controller by eight bit parallel line and to the servo CPU through 4bit communication microcomputer. Besides, RS-422 tranceiver circuit for remote control is connected to the SYSTEM CONTROL 16bit microcomputer.

In addition to the system control and servos the REC/PB circuit of the time code are provided on the SST-1 board.

## 6. POWER SYSTEM

The electric power of the recorder is supplied mainly by PSW-12 DC/DC converter directly connected to the MB-335 mother board. Since the actuation of the DC/DC converter should be controlled by the system control, a switching regulator is mounted on the SST-1 board to supply +5Vdc to the system control and servos.

In order to reduce power consumption in the system, power of each circuit of each board is system controlled and the power of unnecessary circuits for a mode being selected is cutoff by electronic switches located in each circuit. For instance, power of the TBC-19 board is shutdown in the REC mode because recording is not in need of time base corrector. The power for the photo sensor of the threading FG is let off except when threading the tape.

The PSW-12 DC/DC converter converts 12Vdc input into +9, +5, -9, -5, and +48Vdc for microphone phantom power by five switching regulators of just the same type. The PSW-12 has a under voltage detection circuit. When a voltage under specified voltage is detected, it sends a signal to the

SYSTEM CONTROL 16bit microcomputer which in turn stops the operation of the DC/DC converter. The input power goes through FU-52 board which is a non-interrupting power switching circuit between the external power and the internal batteries. In using the external power, conventional switching circuit tends to consume some internal battery power. In BVW-50 recorder, improved switching circuit prevents such unnoticeable power consumption by sharpening switching characteristics.

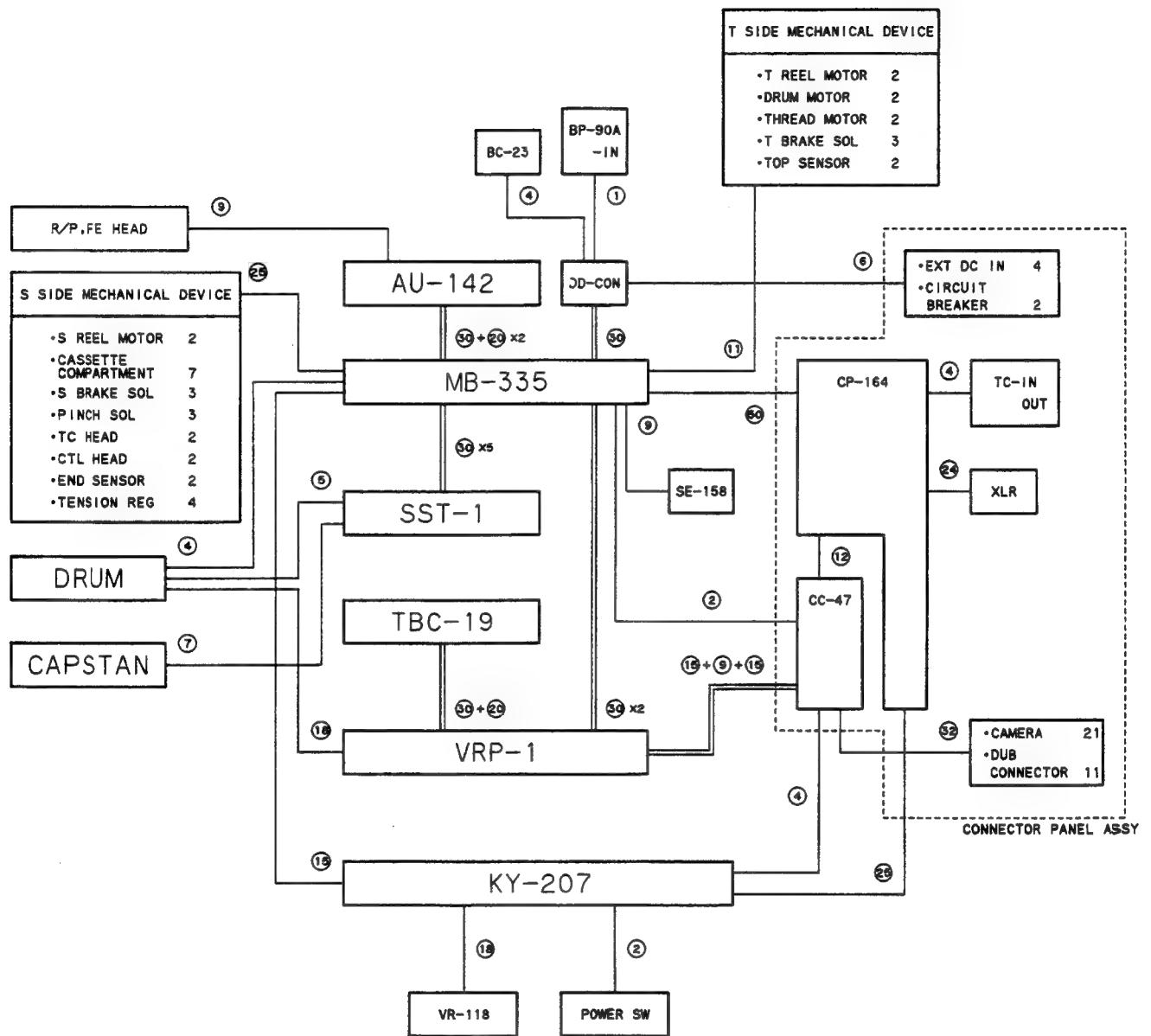


Fig. 1-21-1 WIRING CONNECTION SCHEMATIC

## SECTION 2

### PERIODIC INSPECTION AND MAINTENANCE

#### 2-1. SYSTEM CONTROL OPERATION CHECK

It is recommended that the following check is performed daily before operation. After the check, be sure to reset the switches for use system.

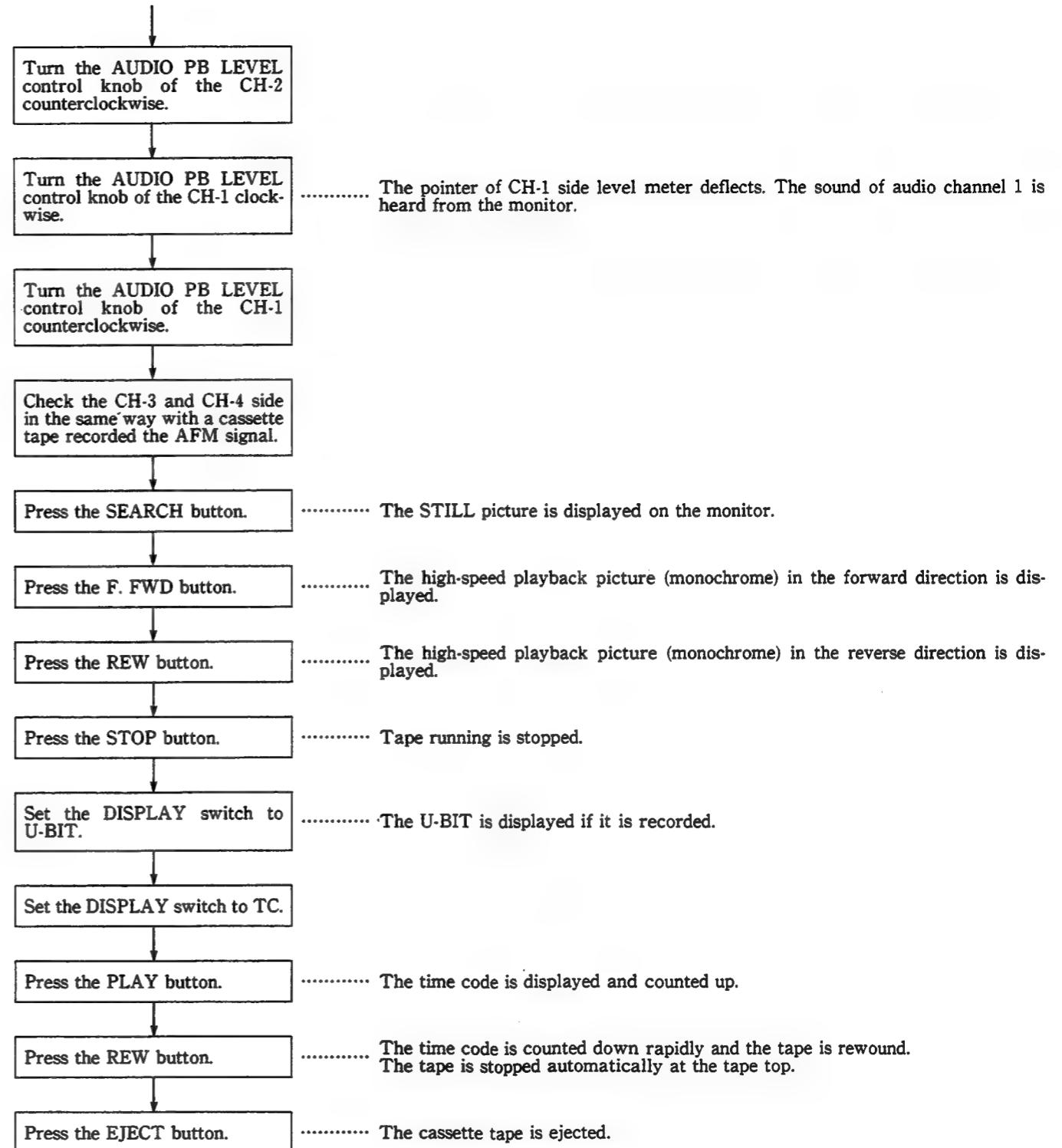
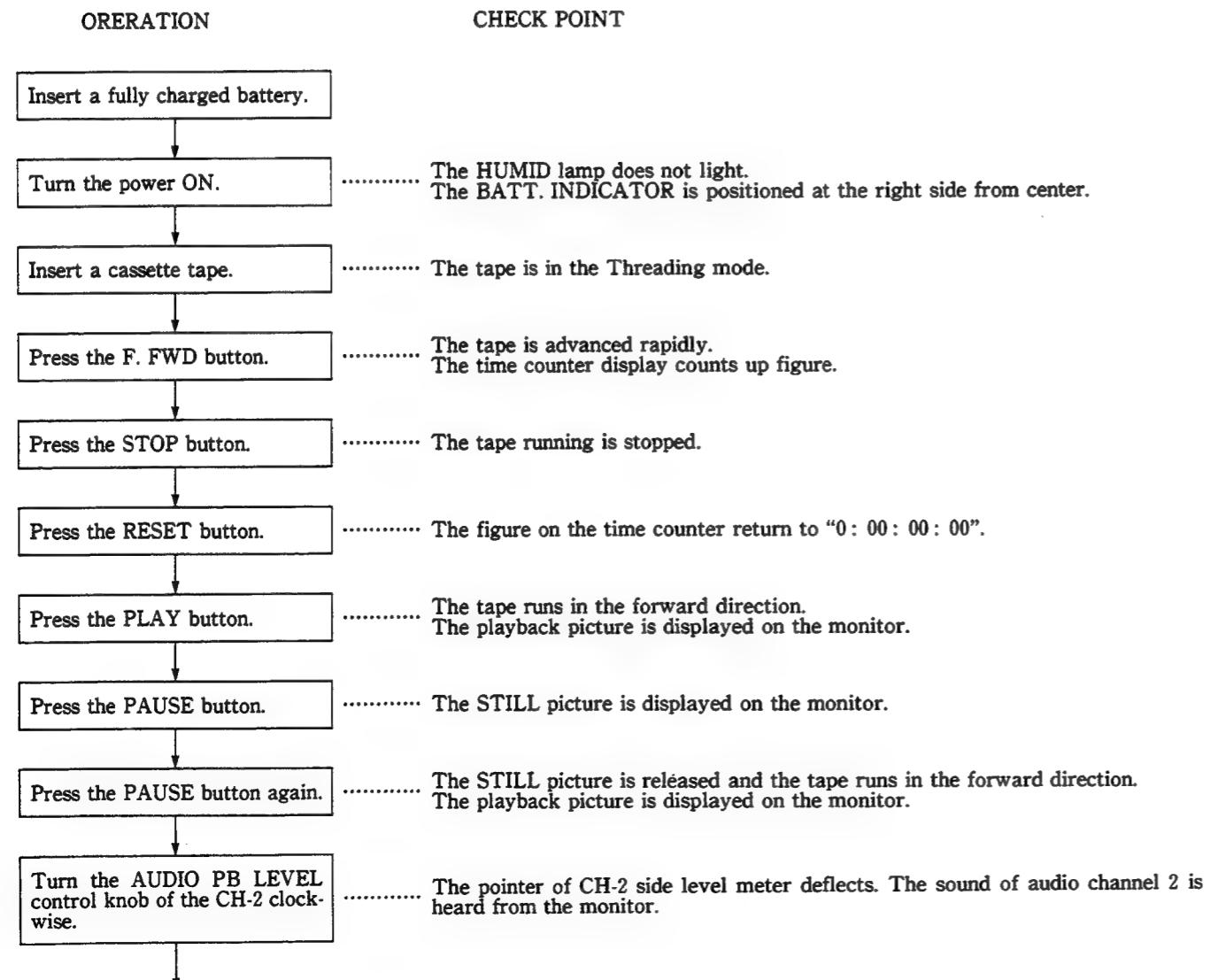
##### 2-1-1. Playback Function Check

**Equipment**

- : (1) Recorded tape (Video, Audio CH-1/CH-2/CH-3/CH-4, Time code)  
Never use an alignment tape.
- (2) Video/Audio Monitor
- (3) Fully charged battery

**Switch Setting :**

- (1) DISPLAY switch : CTL
- (2) MONITOR selector : CH-1 to CH-4 ; ON
- (3) TRACKING control : clicked position



### 2-1-2. REC Function Check in LINE Signal

This check should be performed after Playback Function Check.

**Equipment and Setting :**

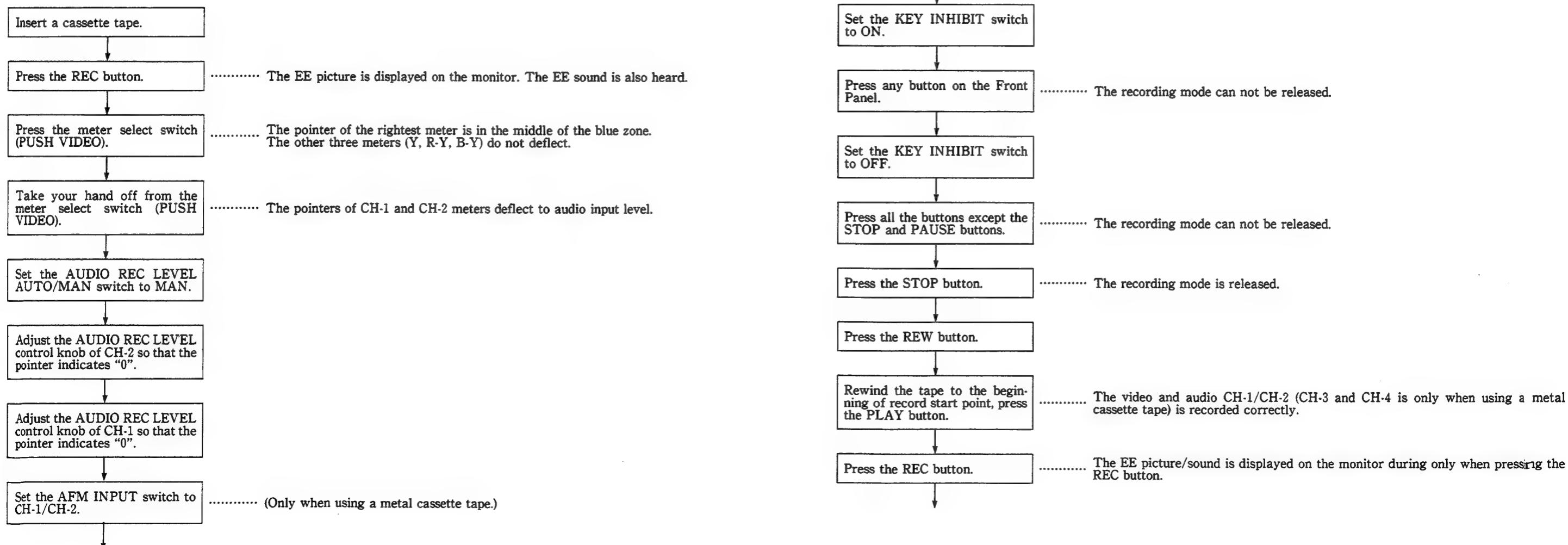
- (1) Video Tape
- (2) Connect the video signal to VIDEO IN connector on the Connector Panel.  
Connect the audio signal to AUDIO connector on the Connector Panel.
- (3) Video/Audio Monitor

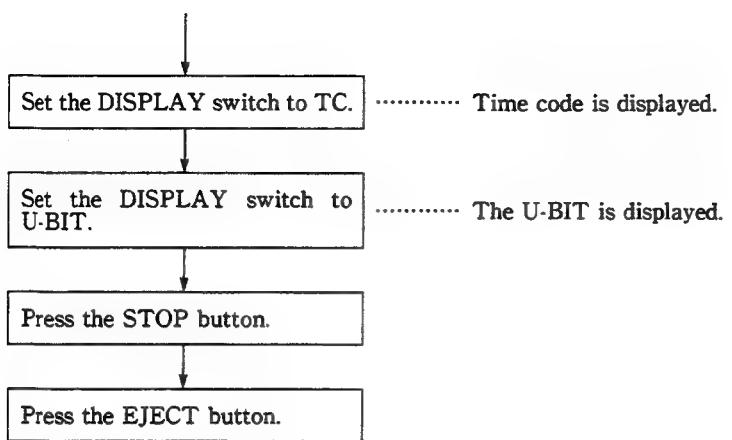
**Switch Setting**

- : (1) DISPLAY switch : TC
- (2) MONITOR selector : CH-1 to CH-4 ; ON
- (3) AUDIO REC LEVEL AUTO/MAN selector : AUTO
- (4) AUDIO IN selector : LINE
- (5) AUDIO-IN level selector : Set the input level
- (6) LINE/CAMERA selector : LINE (VIDEO IN switch)
- (7) F-RUN/R-RUN selector : R-RUN  
(Set the U-BIT to suitable value)

#### OPERATION

#### CHECK POINT





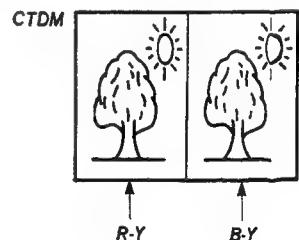
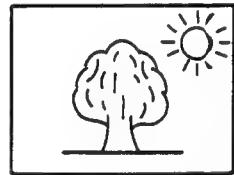
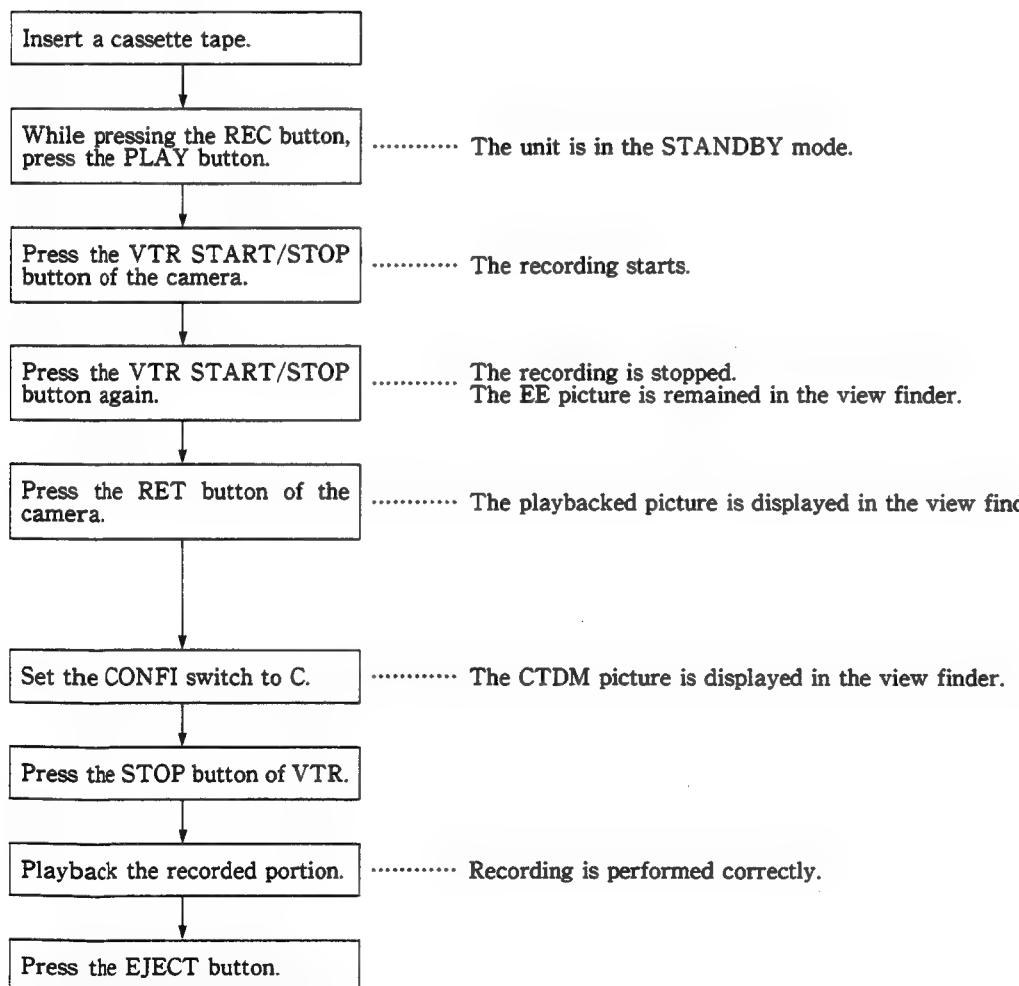
### 2-1-3. Record Function Check in CAMERA Signal

Equipment :  
 (1) Video camera (Connect the 26P connector)  
 (2) Video Tape  
 (3) Video/Audio Monitor

Switch Setting :  
 (1) DISPLAY switch : CTL  
 (2) Monitor selector : CH-1 to CH-4 ; ON  
 (3) AUDIO REC LEVEL AUTO/MAN selector : AUTO  
 (4) AUDIO IN selector : CAMERA  
 (5) VIDEO IN selector : CAMERA  
 (6) CONFI selector ; Y

#### OPERATION

#### CHECK POINT



#### 2-1-4 Audio Dubbing Function Check

Equipment and Setting :

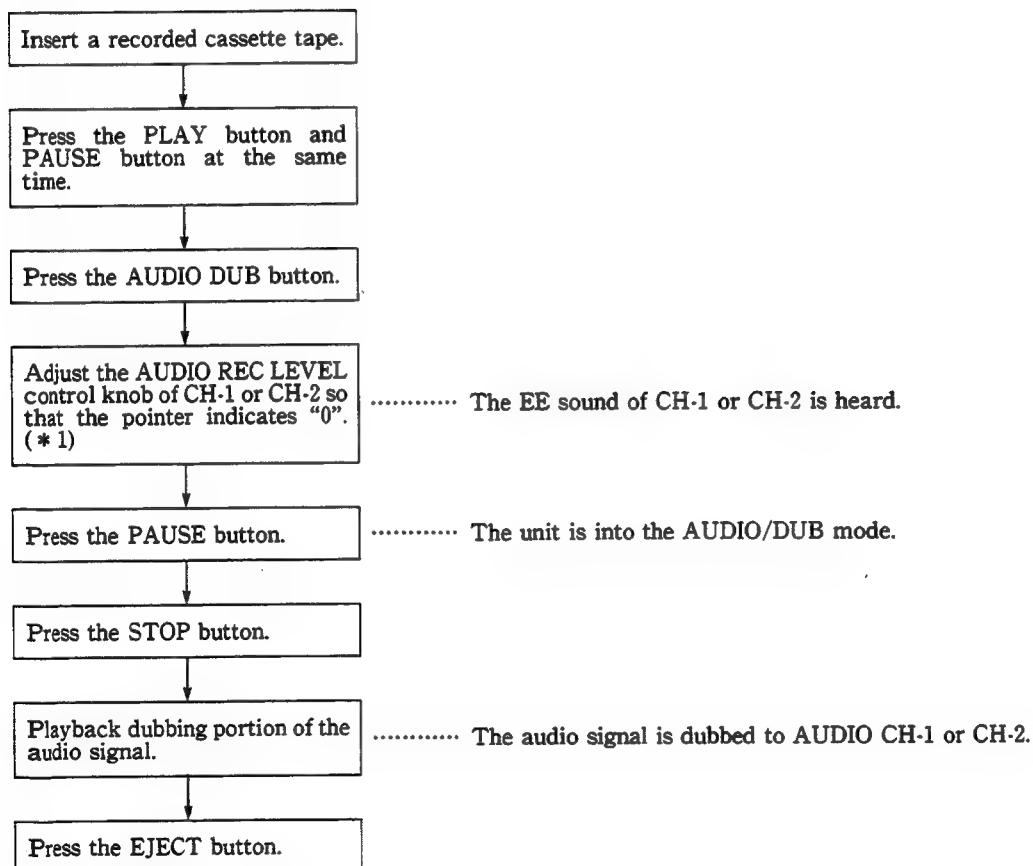
- (1) Recorded tape  
Never use an alignment tape.
- (2) Connect the audio signal to AUDIO IN CH-1 and CH-2.
- (3) Video/Audio Monitor.

Switch Setting :

- (1) DISPLAY switch : CTL
- (2) MONITOR selector : CH-1/CH-2 ; ON
- (3) AUDIO REC LEVEL AUTO/MAN selector : MAN
- (4) AUDIO IN selector : LINE
- (5) DUB switch : CH-1 or CH-2

#### OPERATION

#### CHECK POINT



(\*1)

Adjust the AUDIO REC LEVEL of the channel selected with the DUB switch. When checking the both channels, adjust one by one.

- (a) Turn the PAUSE button ON/OFF. Repeat the AUDIO dubbing in both channels.  
or
- (b) Change the channel with the DUB switch during the dubbing, and check that the audio is dubbed in both CH-1 and CH-2.

## 2-2. PERIODIC INSPECTION

Perform the periodic checks and maintenance in order to ensure correct function and performance and also to extend the life of tape and unit.

Perform the following maintenance before using the unit.

- Clean the tape running surfaces and slider running surface.  
(Refer to section 2-4.)
- Tracking check (Refer to section 4)

### 2-2-1. Hours Meter

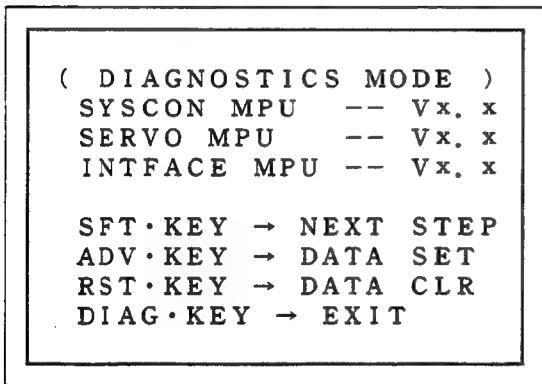
It is recommended that the periodic inspection is performed referring to hours meter as a standard.

How to Display the Hours Meter

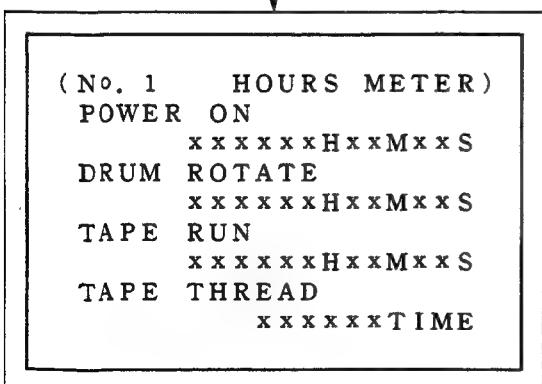
Preparation      Set the switch without a cassette tape inserting.  
Mode SW : FEEDER (PB or PB/EE)  
Connect the video monitor to VIDEO OUT 2.

#### OPERATION

1. Connect the Power Source and turn the power ON.
2. Push the **DIAG** button of the TC Panel with a something tapering. **DIAG** is displayed at LCD and following screen is displayed at the video monitor.



Press the SHIFT button of the TC Panel.



Press the **DIAG** button and HOURS METER MODE is end.

NOTE : It is impossible to reset or set the setting of hours meter display.

## 2-2-2. Periodic Inspection Items

The table below shows the schedule for periodically inspecting the main parts. The items shown in the tables are not the guaranteed lives of the parts.

The cleaning, adjustment and replacement periods depend on the conditions of use, so refer to this table when making up a maintenance and inspection plan.

○ : cleaning, ◎ apply oil/greasing up, △ check/adjustment, ☆ replacement

ITEM	PART NO.	INSPECTION HOURS (H) : DRUM ROTATE											
		500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000
DRUM ASS'Y (DBH-22A-R)	A-6050-807-A	○	○	○	☆	○	○	○	☆	○	○	○	☆
UPPER DRUM ASS'Y (DBR-22-R)	A-6762-454-A	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
BRUSH ASS'Y	A-6050-786-A	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
SLIP RING	A-6050-788-A	○	☆	○	☆	○	☆	○	☆	○	☆	○	☆
PINCH ROLLER	X-3165-756-1 (PINCH ARM ASSY)	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
AUDIO/TC HEAD (EPS244-2103B)	8-825-623-21	○	○	○	☆	○	○	○	☆	○	○	○	☆
AUDIO/CONFI HEAD (PS244-2103C)	8-825-771-11	○	○	○	☆	○	○	○	☆	○	○	○	☆
CTL HEAD (PS244-21B)	8-825-554-83	○	○	○	☆	○	○	○	☆	○	○	○	☆
DRUM BELT	3-172-003-01	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
REEL BELT (S/T)	3-172-003-01	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
THREADING BELT	3-676-303-00	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆
CAPSTAN MOTOR (SCV-0201A)	8-835-437-01				☆				☆				☆
PLUNGER SOLENOID (S/T REEL BRAKE)	1-454-334-41				☆				☆				☆
PLUNGER SOLENOID (PINCH ROLLER)	1-454-383-11				☆				☆				☆
LITHIUM BATTERY (SST-1 BOARD)	1-528-291-11	Replace every two years.											

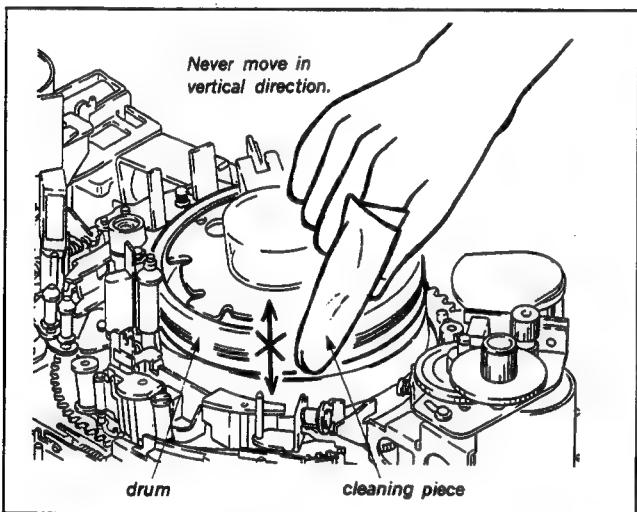
## 2-3. CLEANING

Perform the cleaning as the following procedures.  
After cleaning, insert a cassette tape after cleaning fluid evaporate completely.

### 2-3-1. Video Head

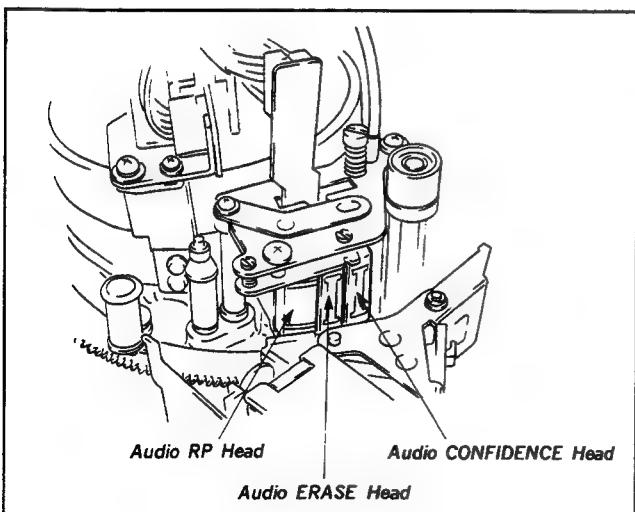
While pressing the cleaning piece moistened with cleaning fluid lightly, and turn the drum slowly by hand.

- NOTE : 1. Never move the cleaning piece in the vertical direction of the head tip.  
2. Perform the cleaning in the power OFF mode.



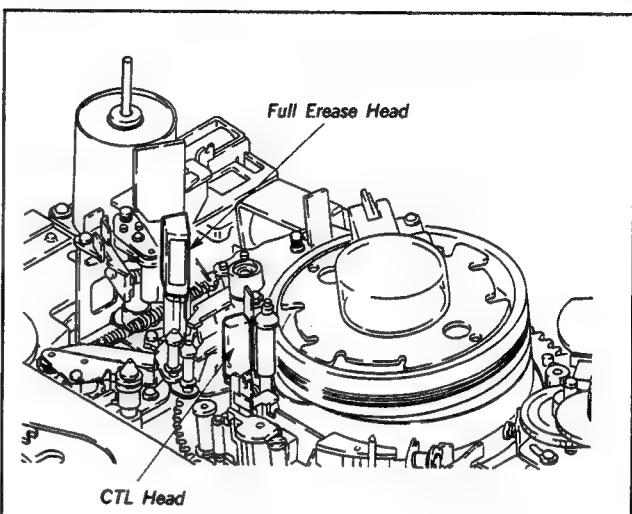
### 2-3-2. Audio RP/ER/CONFI Head

Clean the heads with a cleaning piece moistened with cleaning fluid.



### 2-3-3. CTL/Full Erase Head

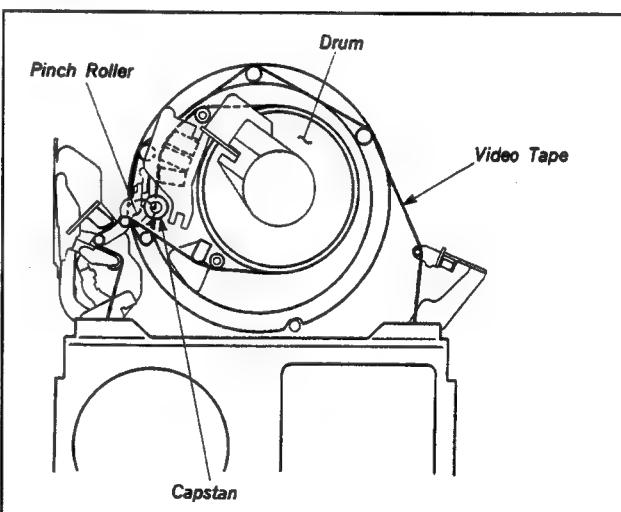
Clean the heads with a cleaning piece moistened with cleaning fluid.



### 2-3-4. Tape Path Surface

Clean the parts which contact with video tape with a cleaning piece moistened with cleaning fluid.

- Tape guides
- Upper and lower drum
- Capstan
- Pinch roller etc.



## SECTION 3

### REPLACEMENT AND ADJUSTMENT OF MAJOR PART

#### 3-1. GENERAL INFORMATION FOR PARTS REPLACEMENT

##### 1. When replacing parts on the upper surface of the chassis

###### Preparations before replacing parts :

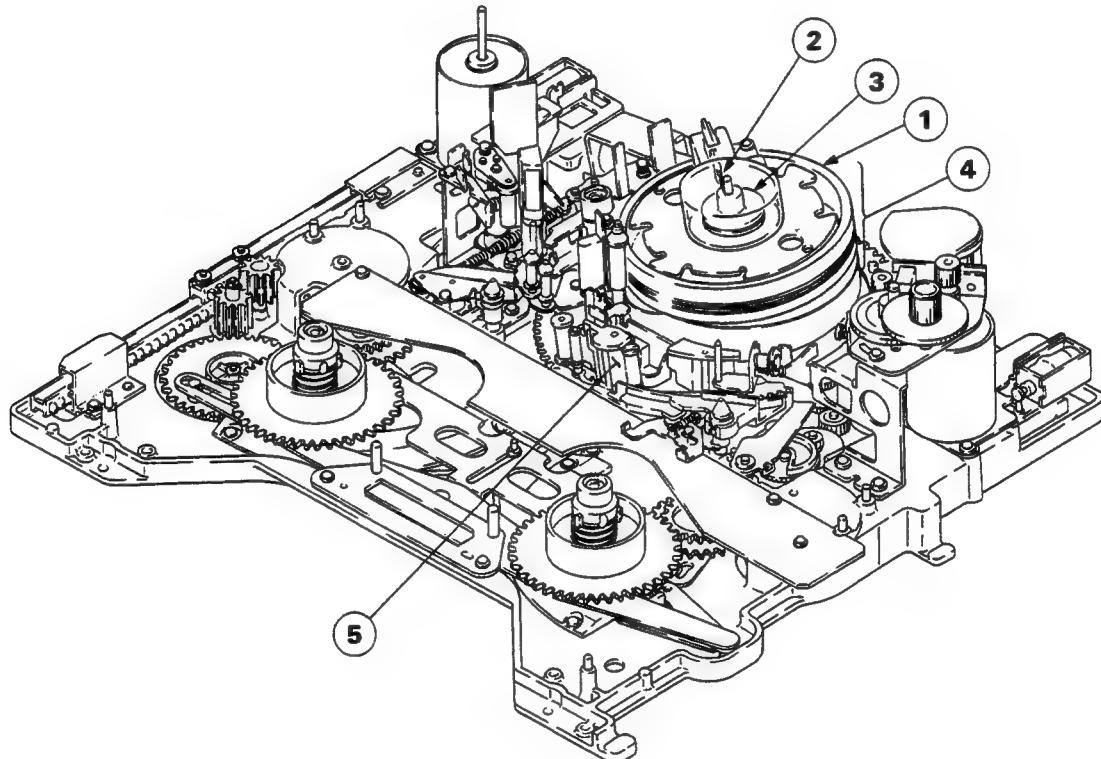
Perform the following items before replacing parts.

- (1) Turn the power off.
- (2) Remove a Top Panel. (Refer to Sec. 1-8.)
- (3) Remove a Cassette Compartment. (Refer to Sec. 1-9.)

Note : These items are omitted from parts replacement procedures.

#### Index

<Top view>



No.	Description	Title	Page
①	Upper Drum Assembly	3-2. Replacement of Upper Drum Assembly	3-6
②	Brush Assembly	3-3. Replacement of Brush Assembly	3-12
③	Slip Ring Assembly	3-4. Replacement of Slip Ring Assembly	3-15
④	Drum Assembly	3-5. Replacement of Drum Assembly	3-17
⑤	Pinch Roller	3-9. Replacement of Pinch Roller	3-23

## 2. When replacing parts on the back surface of the chassis

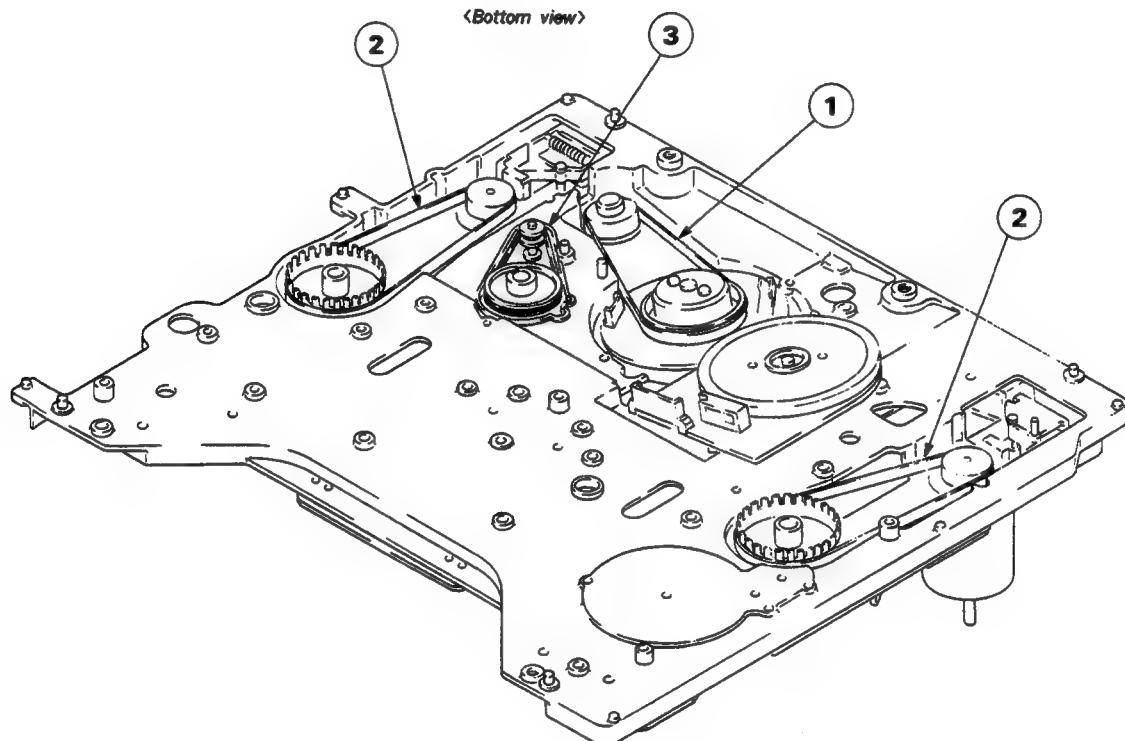
### Preparations before replacing parts :

Perform the following items before replacing parts.

- (1) Turn the power off.
- (2) Place the unit with a Rear Panel Block side down.
- (3) Remove a Bottom Panel. (Refer to Sec. 1-8.)
- (4) Open VRP-1 board. (Refer to Sec. 1-10-1.)
- (5) Open SST-1 board. (Refer to Sec. 1-10-2.)
- (6) Remove a Belt Cover.

Note : These items are omitted from parts replacement procedures.

### Index

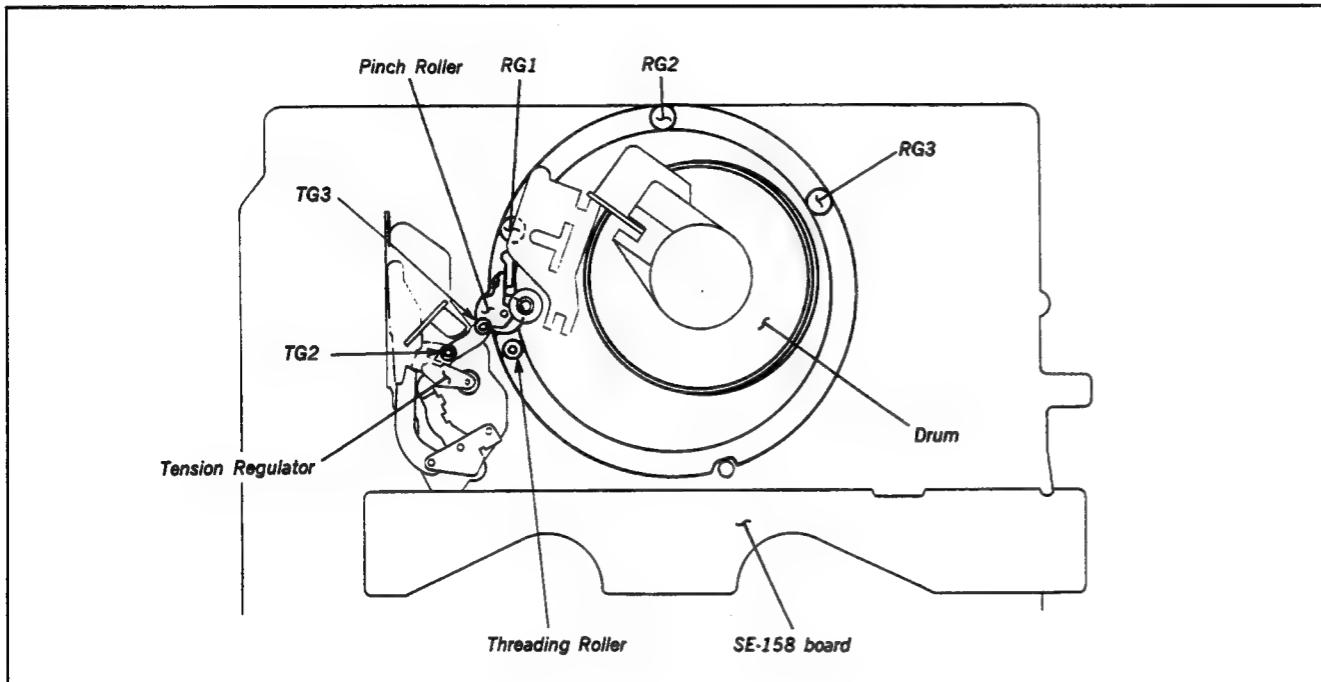


No.	Description	Title	Page
①	Drum Belt	3-6. Replacement of Drum Belt	3-20
②	Reel Belt	3-7. Replacement of Reel Belt	3-21
③	Threading Belt	3-8. Replacement of Threading Belt	3-22

### 3. Threading end mode and unthreading end mode

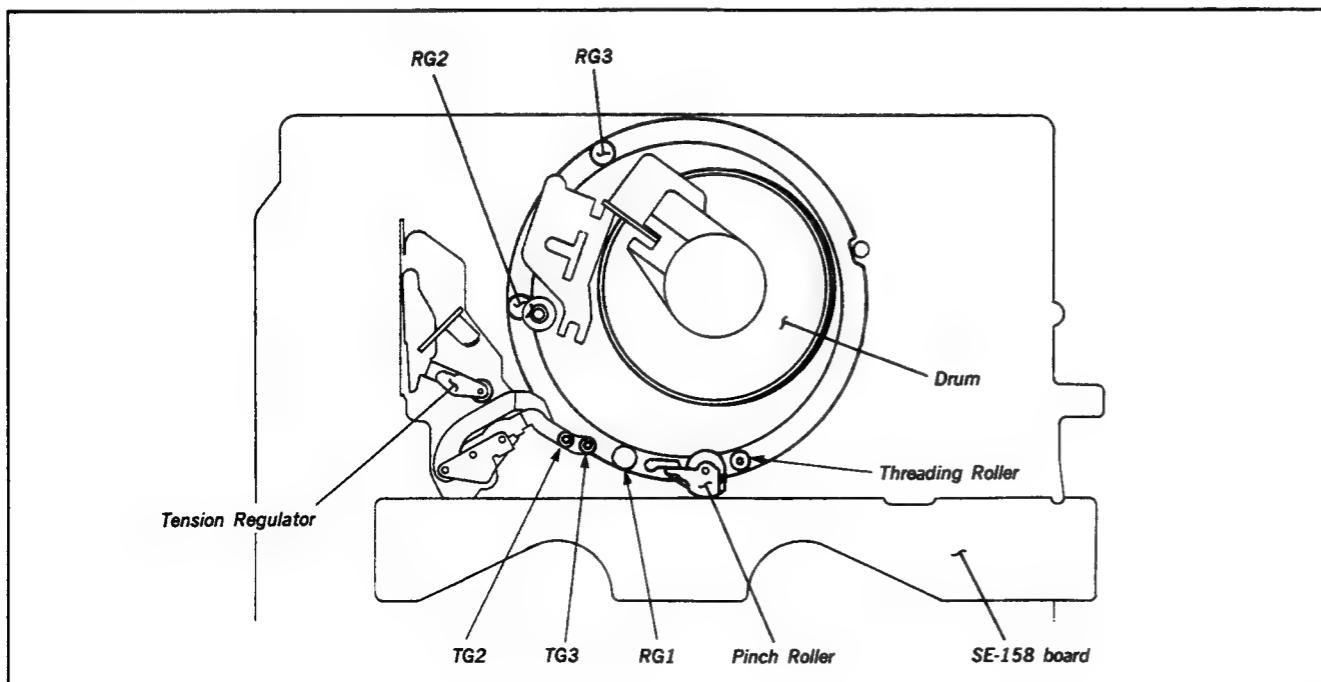
#### Threading end mode :

It means that the Threading Ring rotates in the counterclockwise direction, then stops rotation.



#### Unthreading end mode :

It means that the Threading Ring rotates in the clockwise direction, then stops rotation. (EJECT completion mode)



#### How to put the unit into the threading end mode :

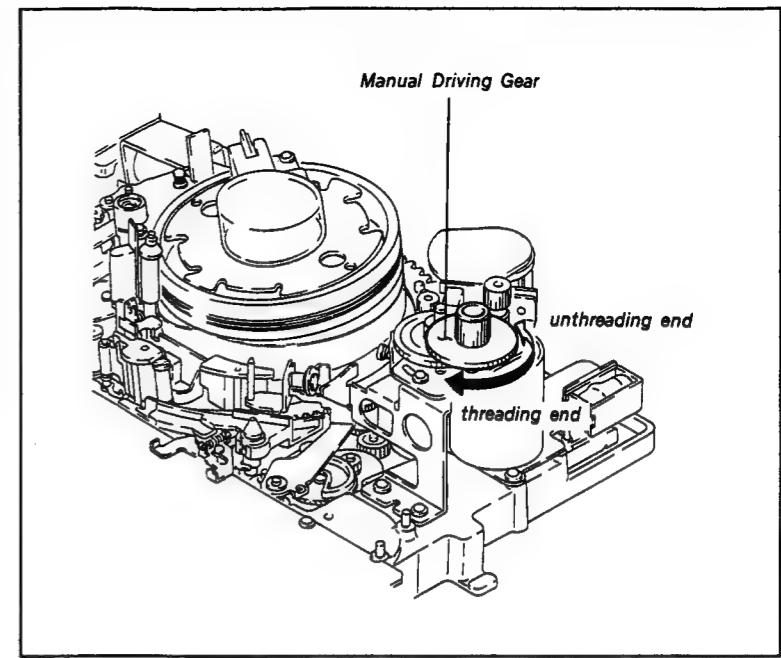
Method 1 : Turn the power on.

Method 2 : Turn the knob of Manual Driving Gear in the clockwise direction while pressing down it.

#### How to put the unit into the unthreading end mode :

Method 1 : Press the EJECT button in the threading end mode.

Method 2 : Turn the knob of Manual Driving Gear in the counterclockwise direction while pressing down it.

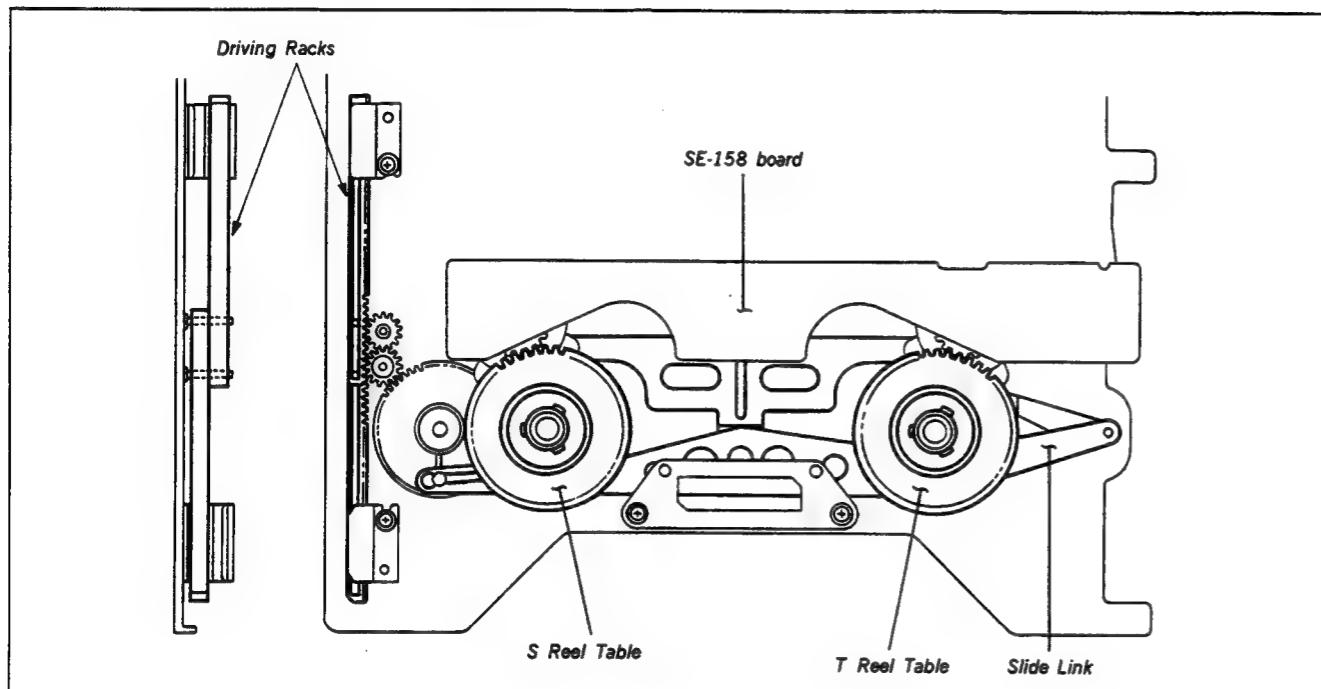


Threading End Mode/Uuthreading End Mode

**4. L cassette position, S cassette position and intermediate position between L and S cassette positions**

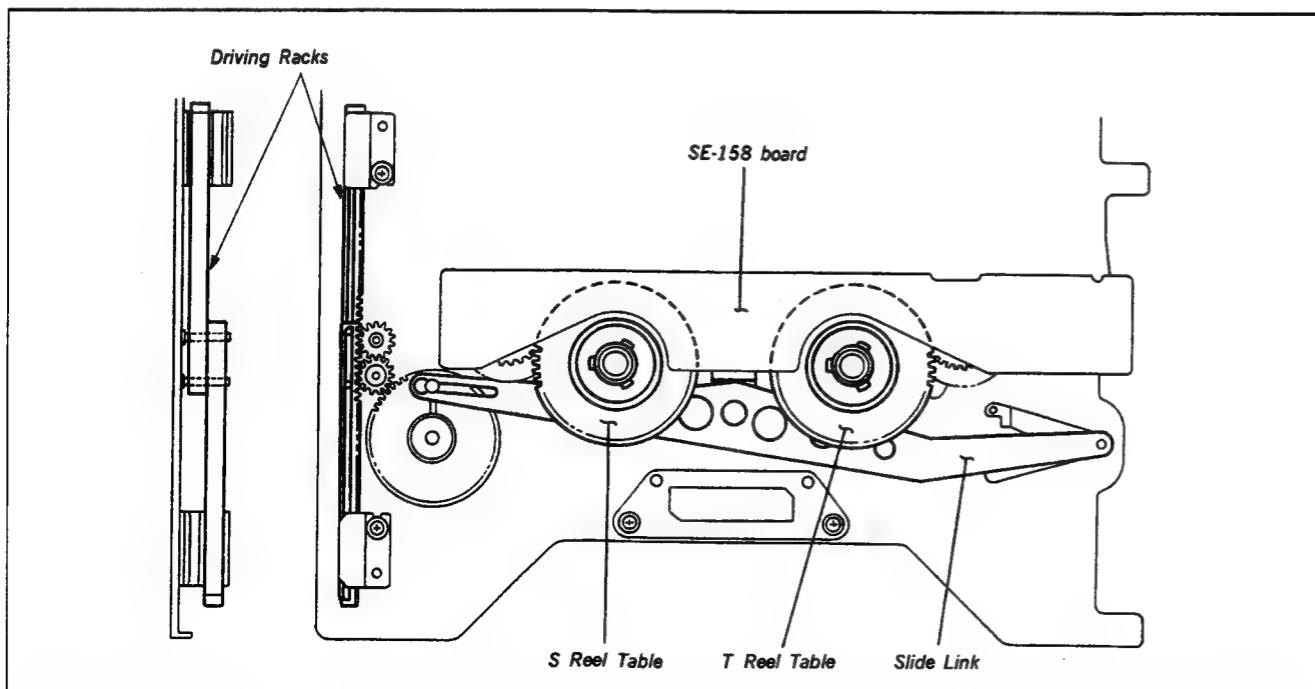
**L cassette position:**

It means that the Reel Tables are in the position of L cassette.



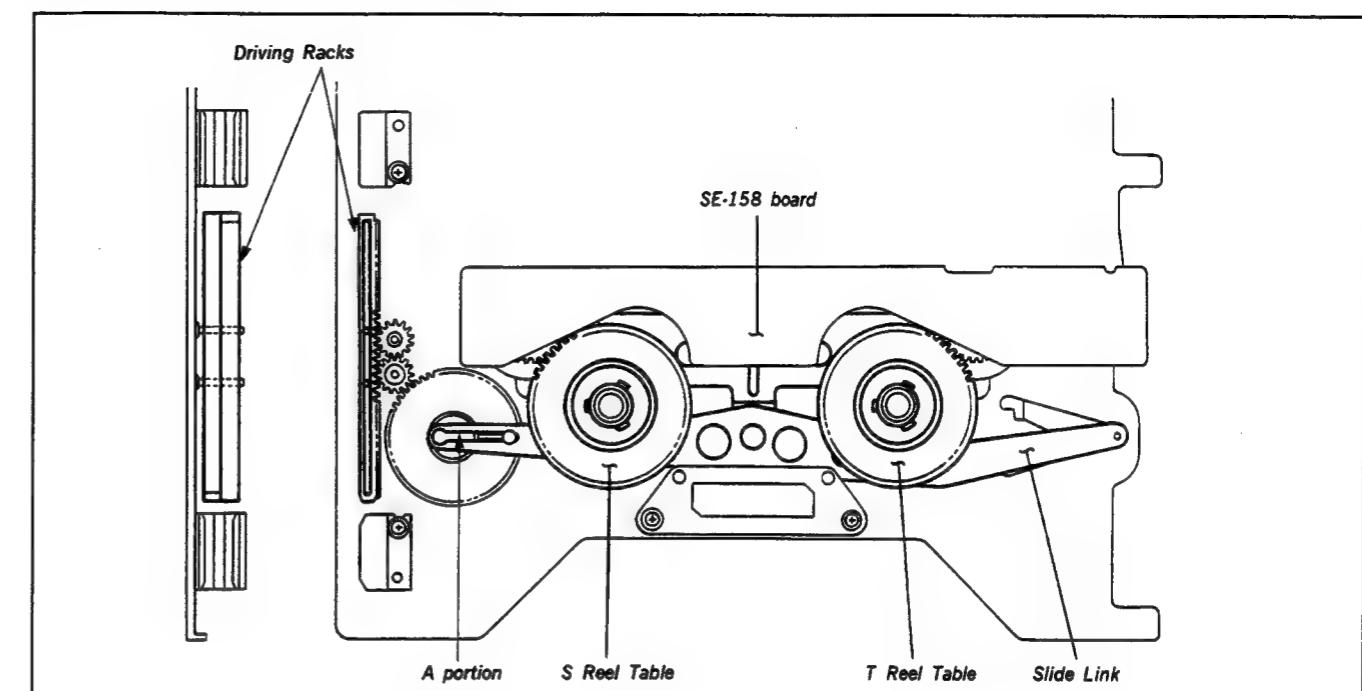
**S cassette position:**

It means that the Reel Tables are in the position of S cassette.



**Intermediate position between L and S cassette positions:**

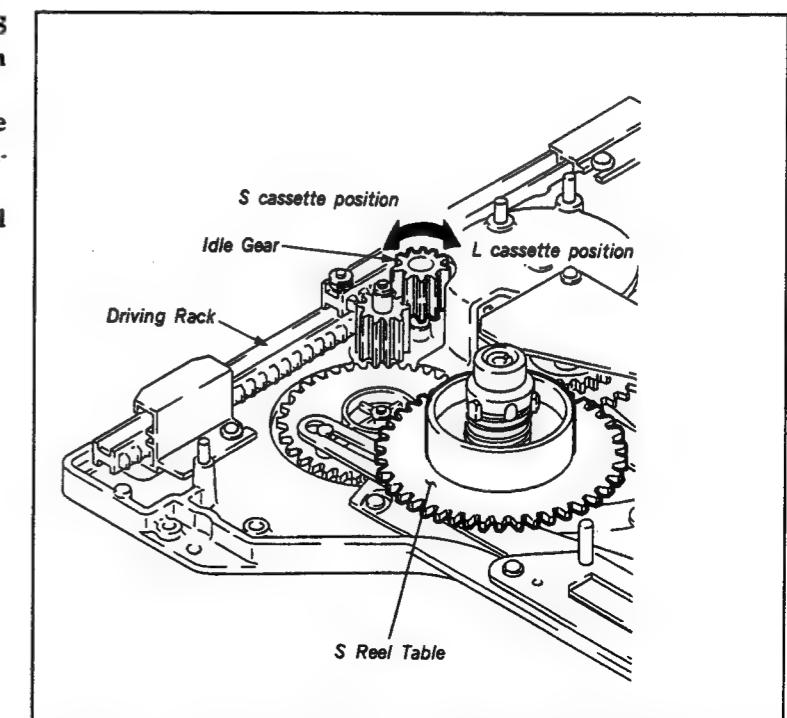
It means that the positions of two Driving Racks are the same place, and the A portion of the Slide Link parallels to the unit.  
(Refer to the following below figure.)



**How to put the unit into the L cassette position, S cassette position and intermediate position between L and S cassette positions :**

Turn an Idle Gear as shown in the figure until the Reel Table Assemblies shift to the desired position and Driving Rack lock.

**Note :** If a cassette tape is inserted, the Reel Tables can not be shifted.

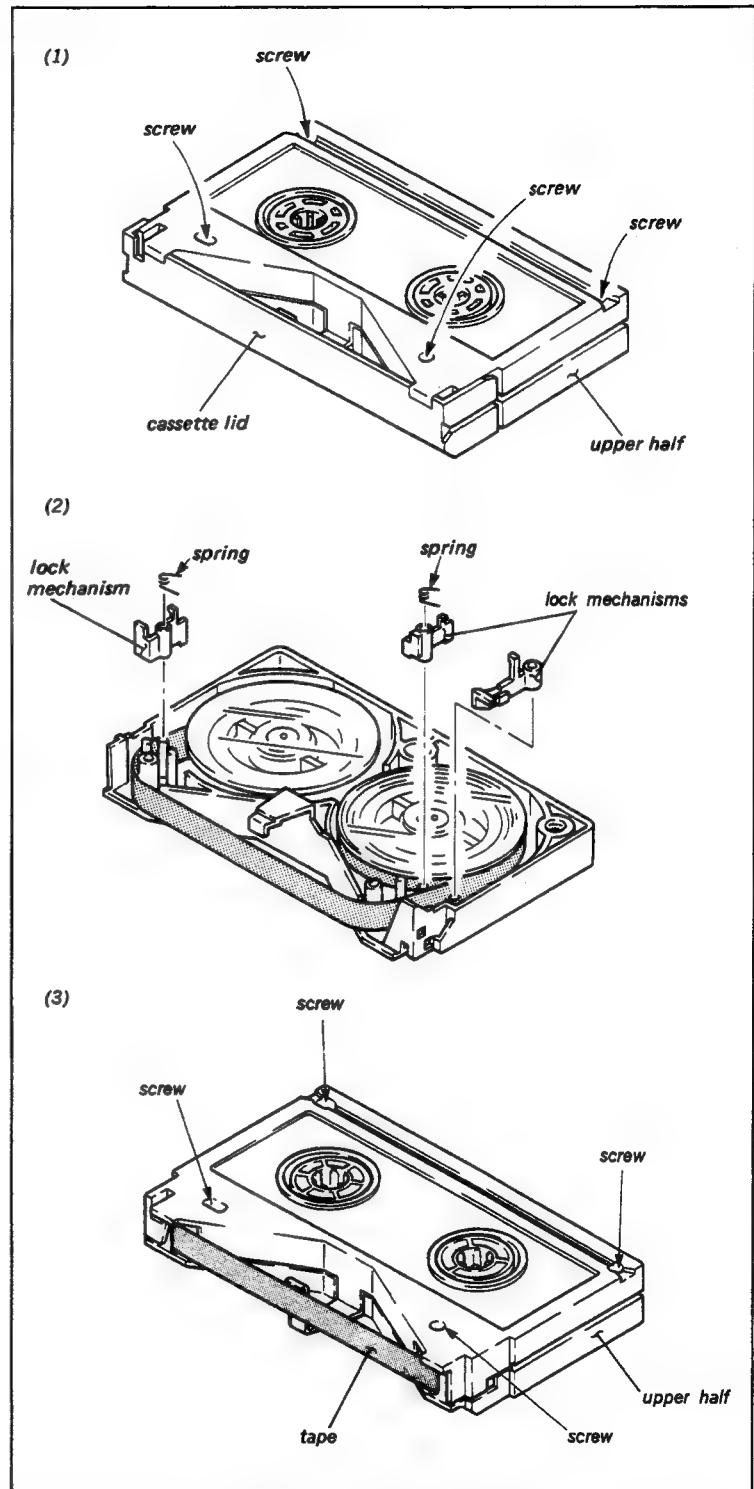


**L Cassette Position/S Cassette Position/Intermediate Position Between L and S Cassette Positions**

## 5. How to make the cassette tape without a lid

Since this unit is designed to be compact, the check and adjustment cannot be performed if a cassette tape lid is installed. Remove the cassette tape lid as follows:

- (1) Remove four screws on the back of the cassette tape as shown in the figure, and remove the upper half of the cassette.
- (2) Remove the lock mechanism parts and the springs on the left and right.
- (3) Remove the cassette lid from the upper half.
- (4) Install the upper half on the lower half with four screws from the back side.



Cassette Tape without a Lid

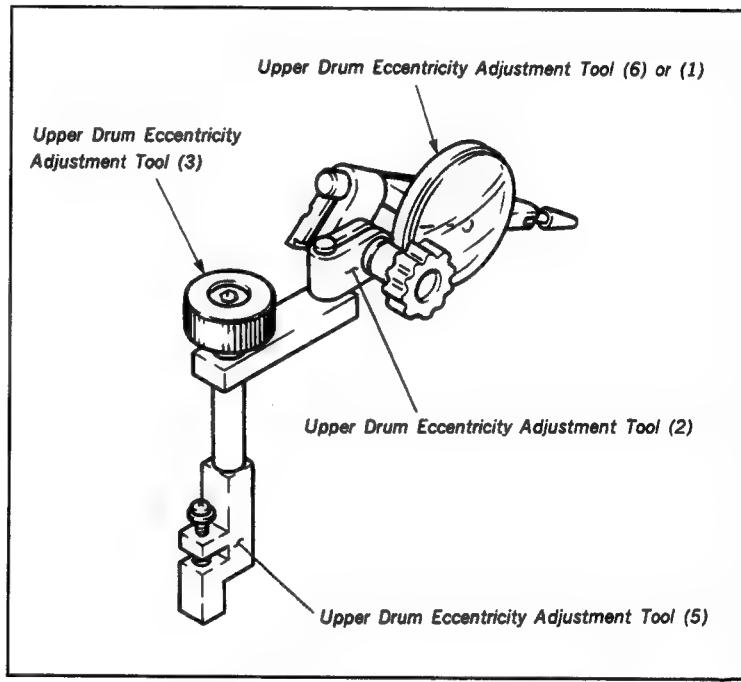
### 3-2. REPLACEMENT OF UPPER DRUM ASSEMBLY

- Replace an Upper Drum Assembly when the video heads are worn or damaged. The unit's performance cannot be guaranteed when PA-119 board on the Upper Drum is replaced (removed or installed). Be sure to replace the Upper Drum Assembly.
- If a spacer exists on the flange surface when the Upper Drum Assembly is removed, keep it left on the flange surface. Do not lose the spacer or replace it by a spacer with different thickness. This disorders the height of the video head from a reference surface and cannot get interchangeability.

#### Fixture:

Upper Drum Eccentricity Adjustment Tool (2)  
Upper Drum Eccentricity Adjustment Tool (3)  
Upper Drum Eccentricity Adjustment Tool (5)  
Upper Drum Eccentricity Adjustment Tool (6)  
or (1)

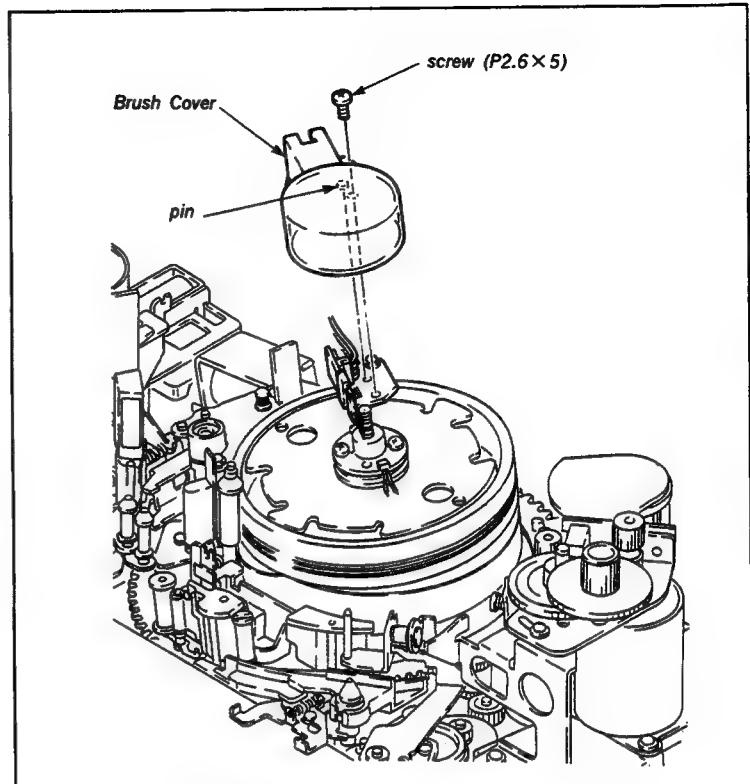
\*Use the Upper Drum Eccentricity Adjustment Tools in combination as shown in the figure.



Upper Drum Eccentricity Adjustment Tool

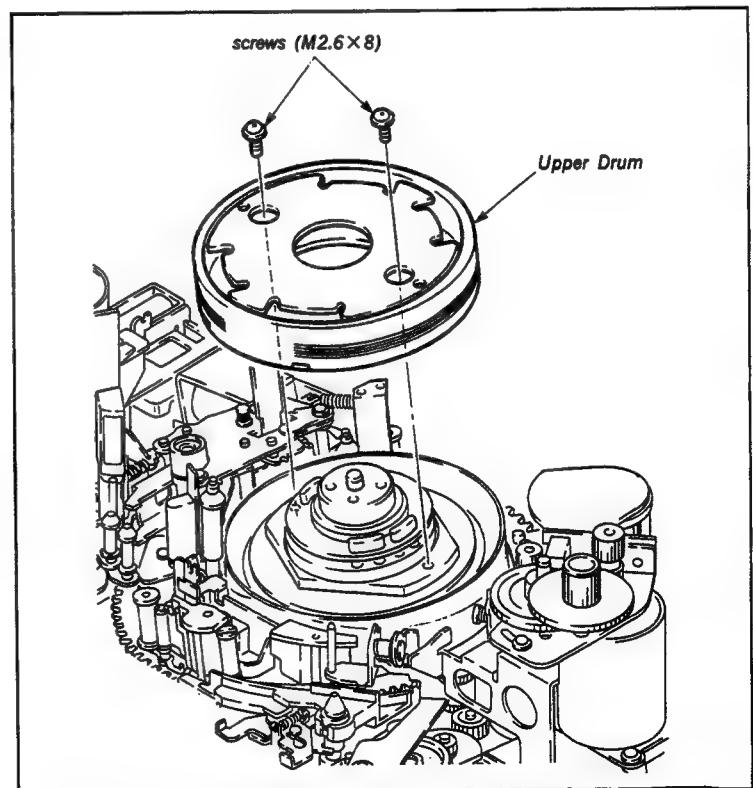
**Removing procedure :**

1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.
2. Remove a Brush Assembly.  
(Refer to Sec. 3-3.)
3. Remove a Slip Ring Assembly.  
(Refer to Sec. 3-4.)



Removal of the Brush Cover

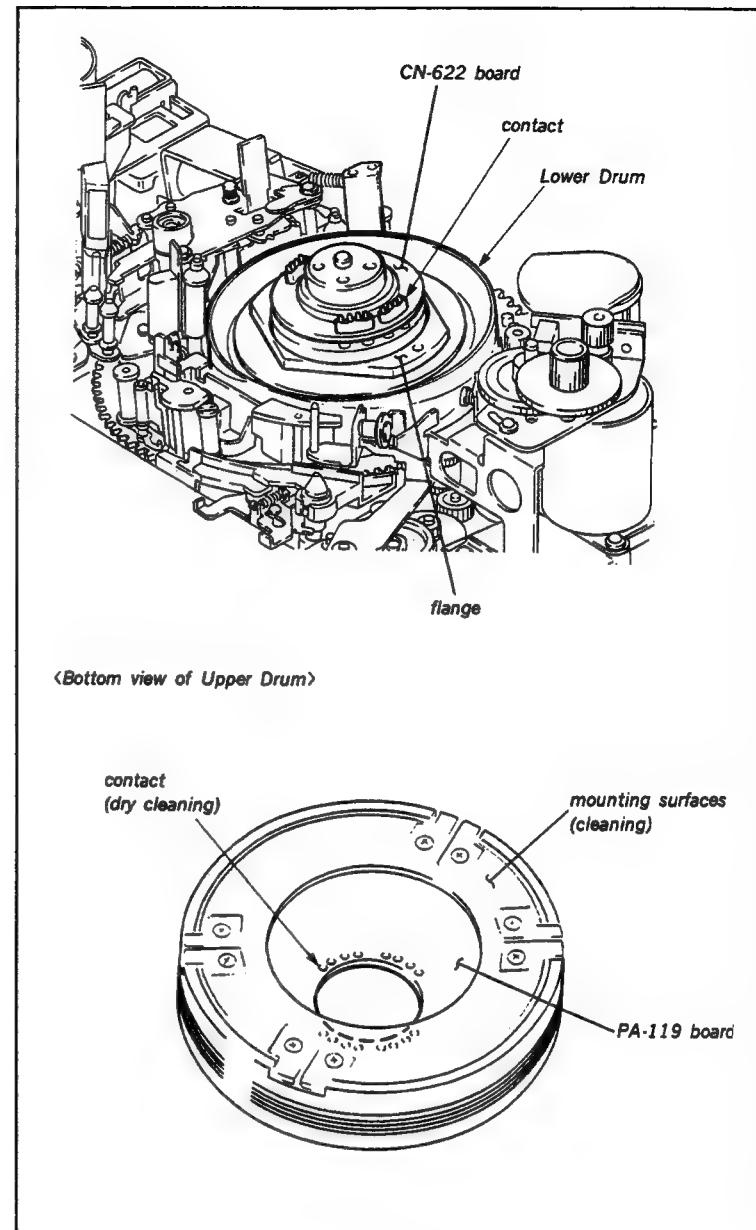
4. Remove two screws (M2.6 x 8) fixing the Upper Drum Assembly and pull out it just upwards.



Removal of the Upper Drum Assembly

**Installing procedure:**

5. Perform the cleaning.
  - (1) Clean the flange surface of the Lower Drum and the mounting surface of a new Upper Drum Assembly with a cleaning piece moistened with cleaning fluid.
  - (2) Clean the contacting surfaces of CN-622 board on the flange and PA-119 board on the Upper Drum with dry cleaning piece.

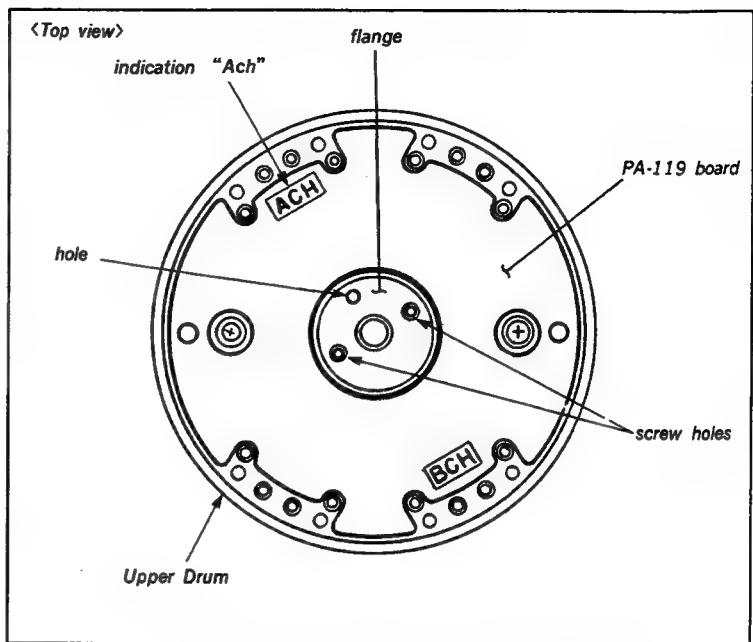


**Cleaning**

6. Set the "Ach" display on PA-119 board to the side of the hole shown in the figure of a flange and install the Upper Drum Assembly tentatively on the Lower Drum Assembly with two screws (M2.6 x 8).

**Caution 1:** Be careful not to damage the tape running surface of the Upper Drum and the video heads when installing the Upper Drum Assembly on the Lower Drum. Moreover, take care not to damage the tape guides around the Drum Assembly.

**Caution 2:** "Ach" (REC Ach) is the reference of all video heads. Pay careful attention to the installing position.



Installation of the Upper Drum Assembly

**Adjustment procedure:**

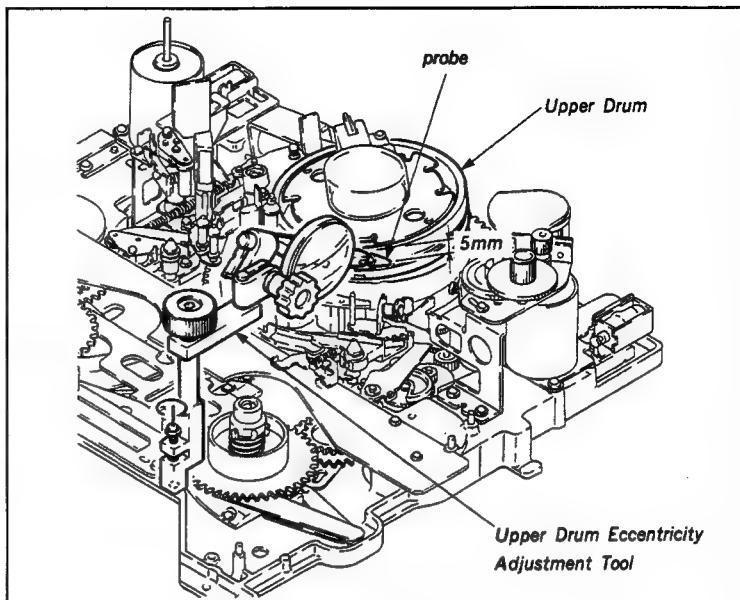
7. Install the Upper Drum Eccentricity Adjustment Tool.

- (1) Clean the probe with a cleaning piece moistened with cleaning fluid.

**Caution:** Do not use the probe with the dust attached. This may damage the tape running surface of the Upper Drum.

- (2) Install the tool so that the probe positions at the point about 5 mm apart from the upper edge of the Upper Drum.

**Caution:** Take care that the probe does not touch the video head.



Installation of the Tool

8. Perform the Upper Drum Eccentricity Adjustment.

- (1) Rotate the Upper Drum slowly counterclockwise.

Check that the deflection of a pointer meets the specification during one complete rotation.

If the specification is met, perform step (3) and subsequent steps.

If not, perform step (2), then step (3) and subsequent steps.

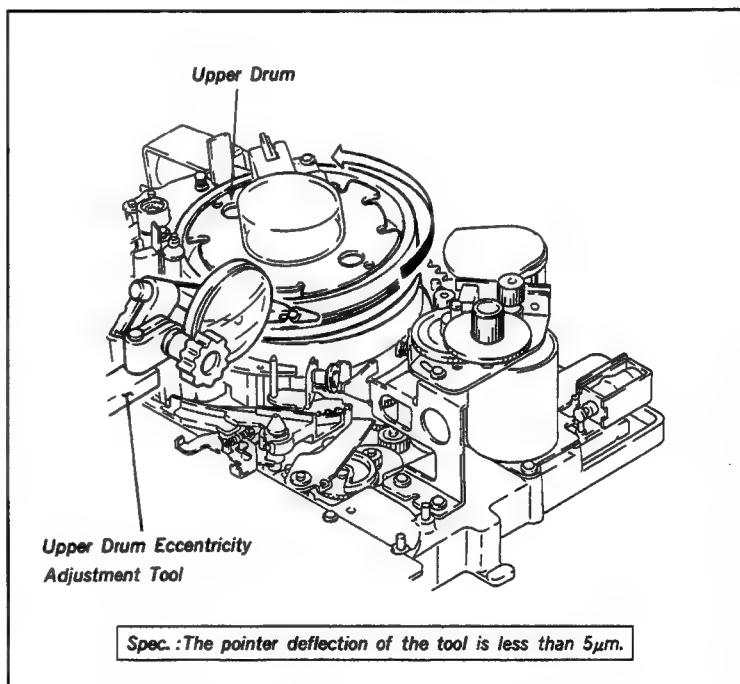
- (2) When the above specification is not met :

① Tap the upper edge of the Upper Drum slightly with the handle of a screwdriver wound in cloth.

② Check that the specification is met again.

- (3) Tighten two screws alternately and gradually in turn. (Tightening torque : 6 kg. cm)

- (4) Check that the eccentricity of the Upper Drum meets the specification.



Upper Drum Eccentricity Adjustment

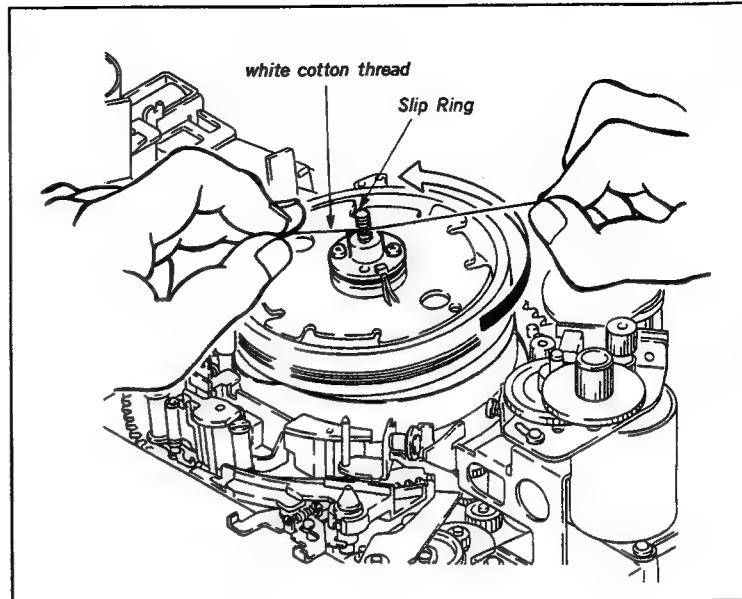
9. Remove the Upper Drum Eccentricity Adjustment Tools.

**Caution:** Take care that the probe does not touch the video head.

10. Install the Slip Ring Assembly.

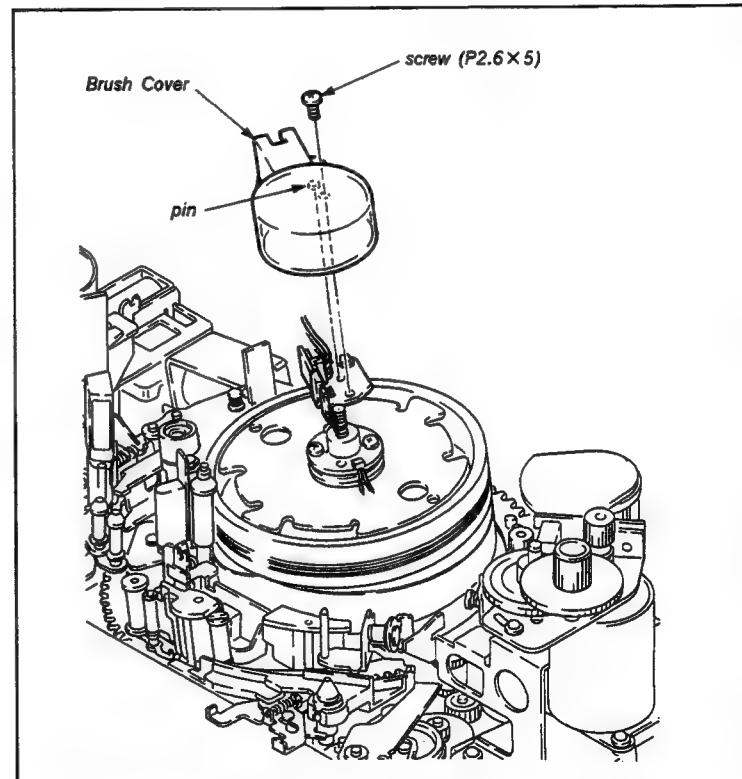
(Refer to Sec. 3-4.)

11. Clean the Slip Ring.
  - (1) Press the white cotton thread against the groove of the Slip Ring.
  - (2) Rotate the Upper Drum slowly counterclockwise.
  
12. Install the Brush Assembly.  
(Refer to Sec. 3-3.)



**Cleaning of the Slip Ring**

13. Install the Brush Cover.
  - (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
  - (2) Tighten the screw (P2.6 x 5).
  
14. Clean the video heads and the tape running surface of the Upper Drum with a cleaning piece moistened with cleaning fluid.
  
15. Perform the Tape Run Alignment.
  - (1) Tracking Adjustment (Refer to Sec. 4-7.)
  - (2) CTL Head Position Adjustment (Refer to Sec. 4-9.)
  - (3) TC Head Position Adjustment (Refer to Sec. 4-12.)
  - (4) Switching Position Adjustment (Refer to Sec. 4-14.)
  
16. Perform the Video System Adjustment.  
(Refer to Sec. 8.)

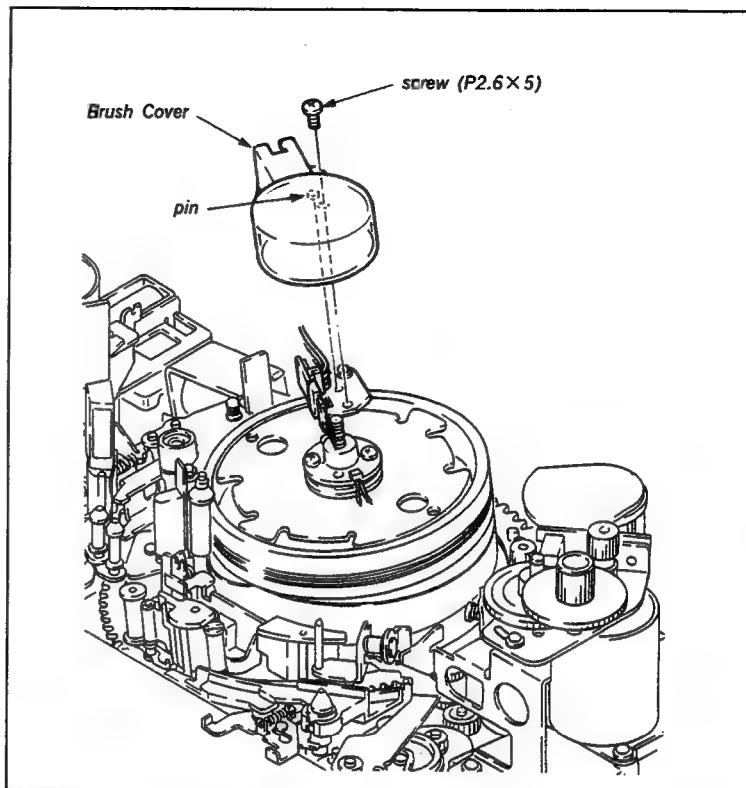


**Installation of the Brush Cover**

### 3-3. REPLACEMENT OF BRUSH ASSEMBLY

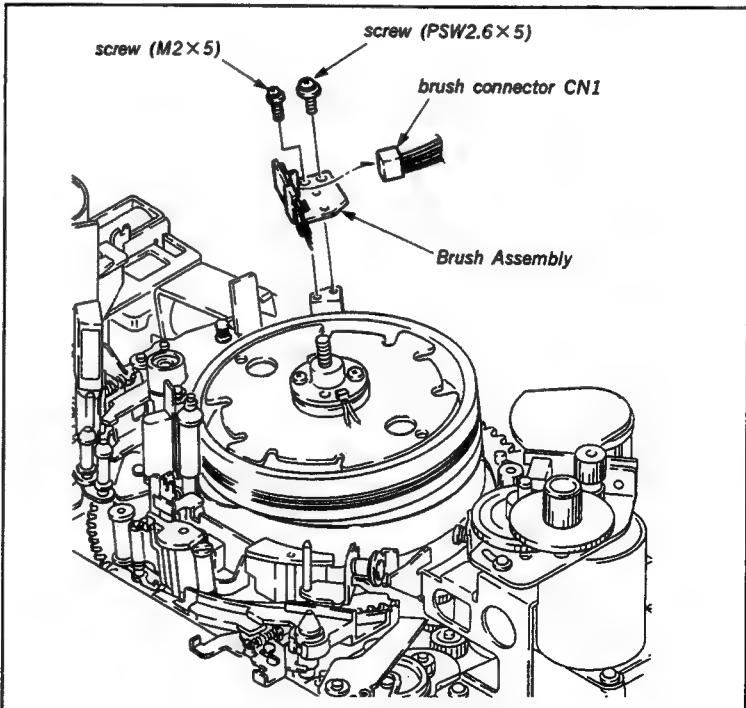
#### Removing procedure:

1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.



Removal of the Brush Cover

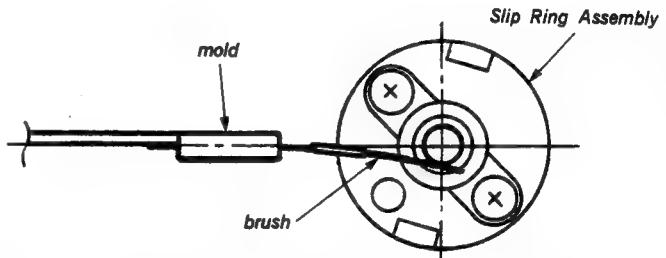
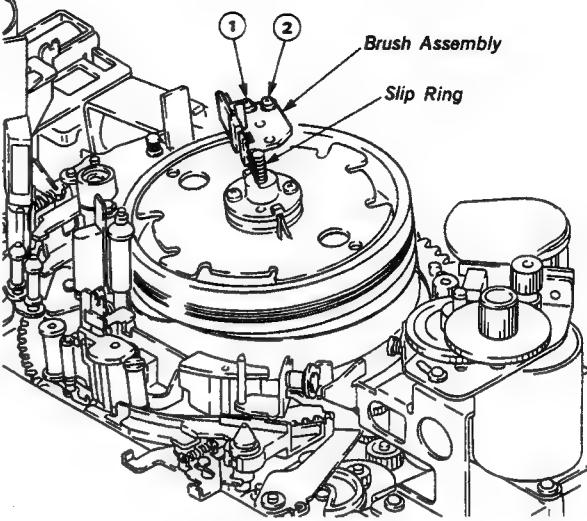
2. Disconnect a brush connector CN1.
3. Remove the screws (PSW2.6 x 5) and (M2 x 5) fixing the Brush Assembly, then remove the Brush Assembly.



Removal of the Brush Assembly

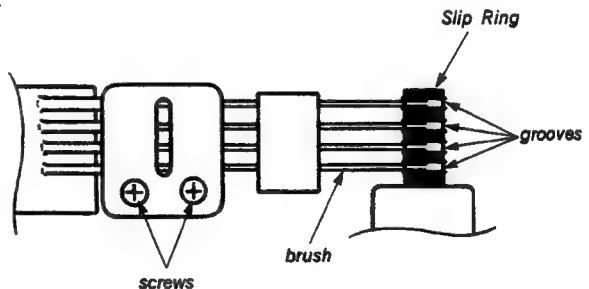
**Installing procedure :**

4. Clean the upper surface of a Brush Support and the mounting surface of a new Brush Base with a cleaning piece moistened with cleaning fluid.
5. Install a new Brush Assembly.
  - (1) While aligning the Brushes with the grooves of a Slip Ring, thread the screws (PSW2.6 x 5) and (M2 x 5) snugly but do not tighten.
  - (2) Adjust the position of the Brush Assembly so that the bending of the Brush meets the specification and tighten the screws in the order shown in the figure.
  - (3) Check that the specification is met again.
  - (4) Check that the Brushes are parallel to the grooves of the Slip Ring. (Fig.2)  
If not, loosen two screws shown in the figure and adjust the height of the Brush.
6. Connect the brush connector CN1.



*Spec. : The center line of the mold align with the center of the Slip Ring, as view from above.*

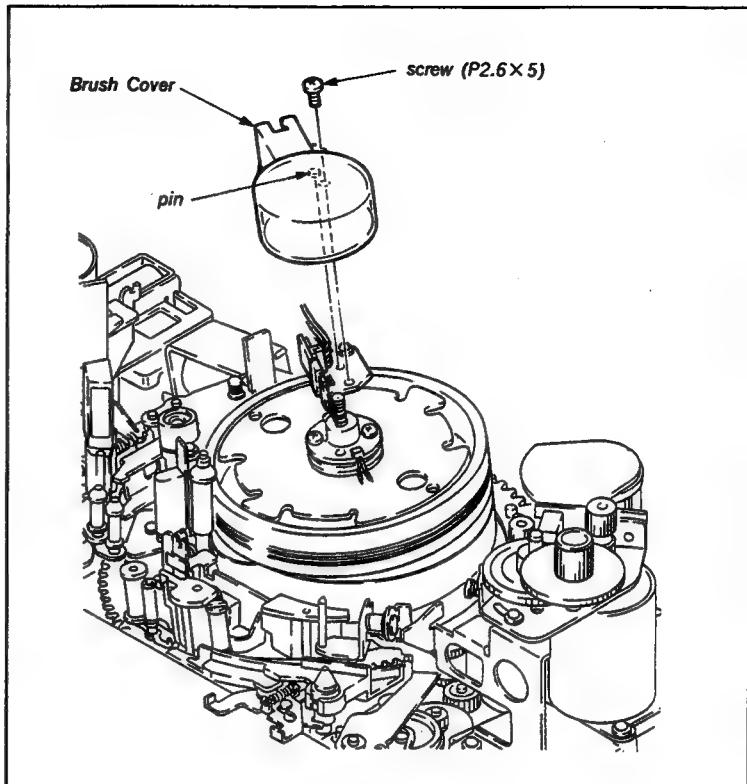
*<Fig. 2>*



**Installation of the Brush Assembly**

7. Install the Brush Cover.

- (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
- (2) Tighten the screw (P2.6 x 5).

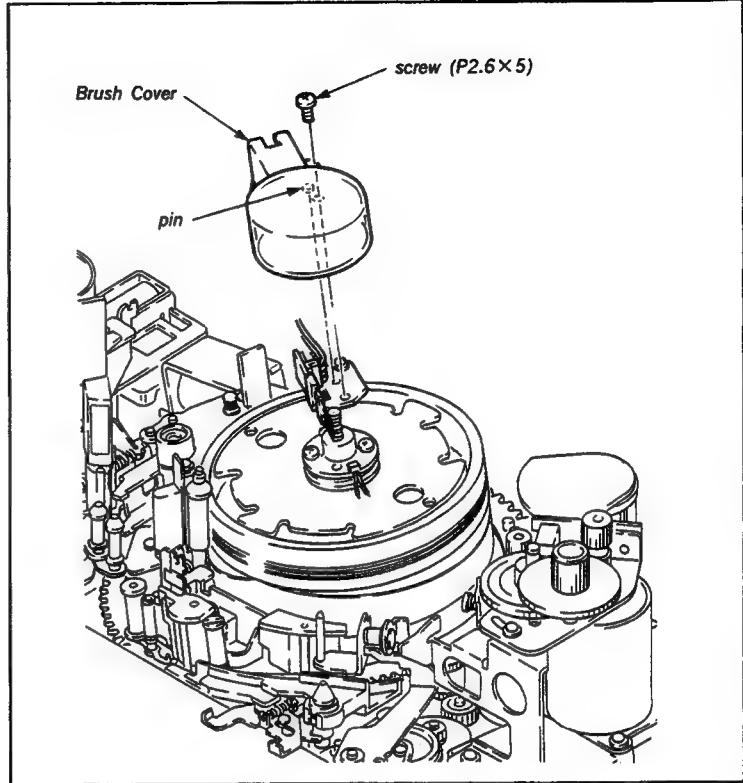


Installation of the Brush Cover

### 3-4. REPLACEMENT OF SLIP RING ASSEMBLY

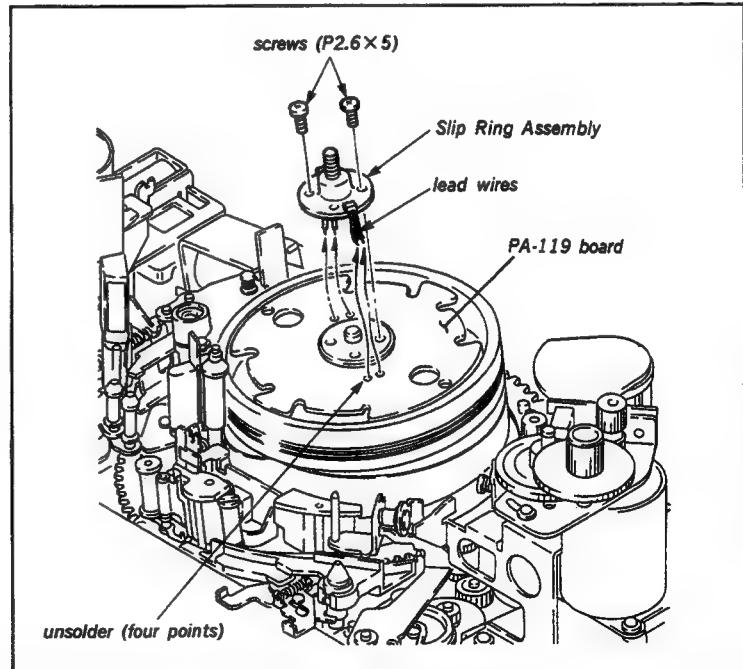
#### Removing procedure:

1. Loosen a screw (P2.6 x 5) shown in the figure, and remove a Brush Cover.
2. Disconnect a brush connector CN1.
3. Remove a Brush Assembly.  
(Refer to Sec. 3-3.)



Removal of the Brush Cover

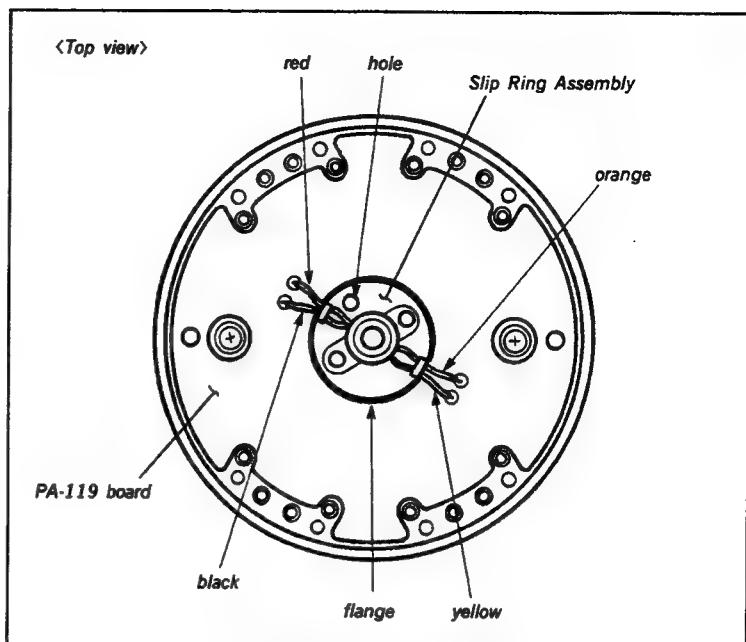
4. Remove a Slip Ring Assembly.
  - (1) Unsolder four lead wires soldered on PA-119 board.
  - (2) Remove two screws (PS2.6 x 5) shown in the figure.



Removal of the Slip Ring

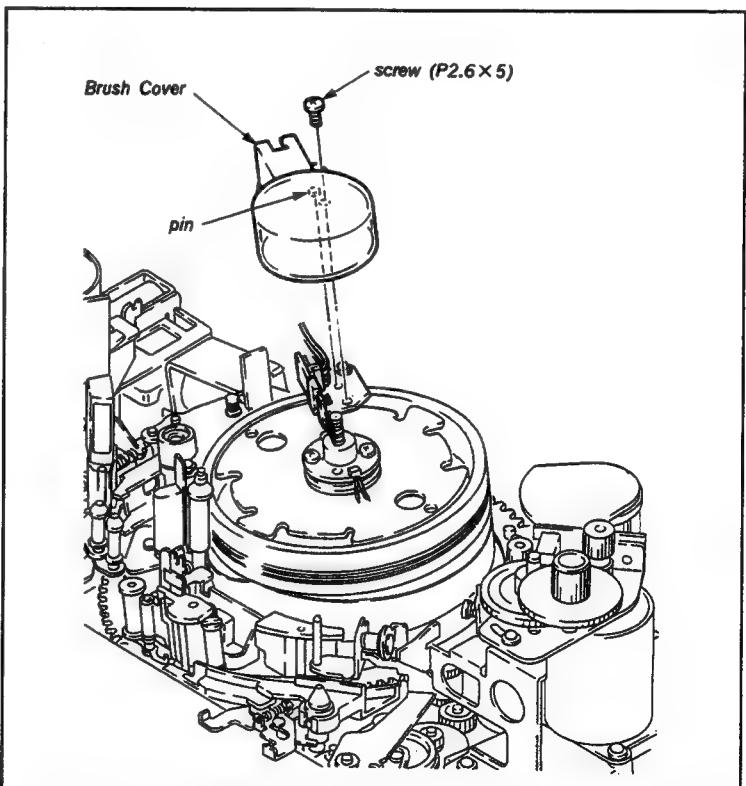
**Installing procedure :**

5. Clean the Slip Ring Assembly mounting surface of a flange and the mounting surface of a new Slip Ring Assembly with a cleaning piece moistened with cleaning fluid.
6. Install the new Slip Ring Assembly.
  - (1) Align the Slip Ring Assembly with the hole position of the flange and secure it with two screws (PS2.6 x 5).
  - (2) Wire four lead wires as shown in the figure and solder them on PA-119 board.
7. Install the Brush Assembly.  
(Refer to Sec. 3-3.)
8. Connect the brush connector CN1.



**Installation of the Slip Ring**

9. Install the Brush Cover.
  - (1) Put the pin on the back of the Brush Cover into the hole of the Brush Base.
  - (2) Tighten the screw (P2.6 x 5).

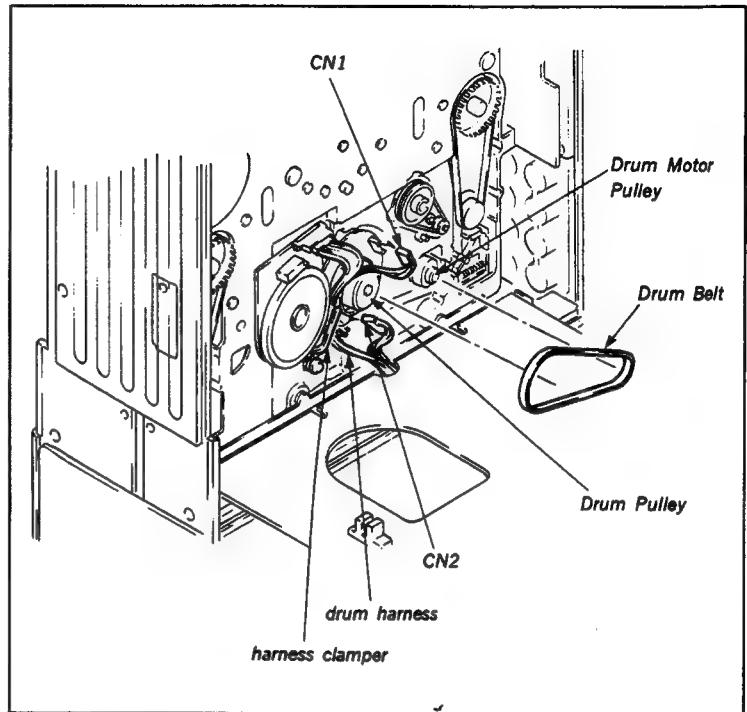


**Installation of the Brush Cover**

### 3-5. REPLACEMENT OF DRUM ASSEMBLY

#### Removing procedure :

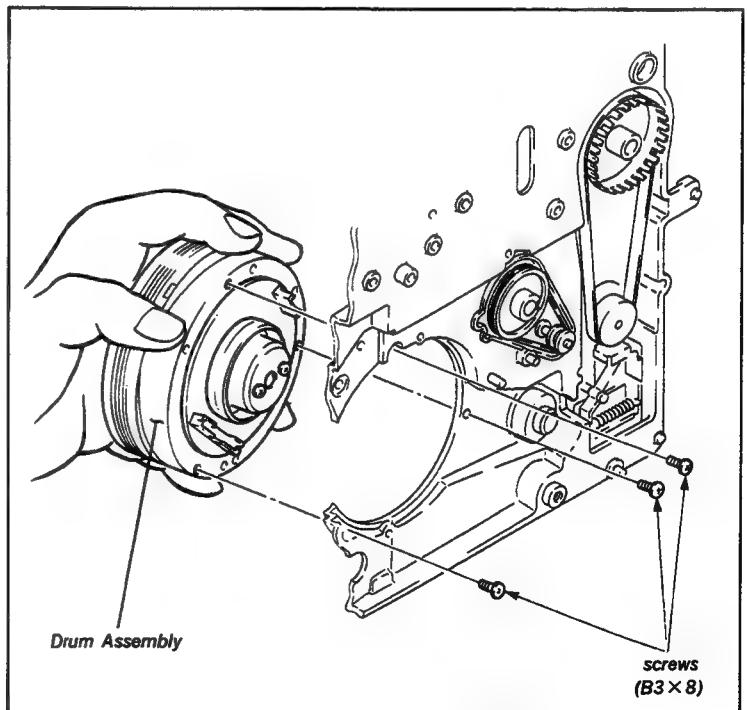
1. Disconnect a brush connector CN1.
2. Place the unit with a Rear Panel Block side down.
3. Remove a Drum Belt from a Drum Pulley and Drum Motor Pulley.
4. Remove a drum harness from a harness clamper.
5. Disconnect two connectors (CN1 and CN2) connected to the Drum Assembly.



**Removal of the Drum Belt and Connector**

6. Remove three screws ( $B3 \times 8$ ) fixing the Drum Assembly, then remove the Drum Assembly.

**Caution 1:** Hold the Drum Assembly by hand to prevent it from falling.  
**Caution 2:** Be careful not to damage the tape guides around the Drum Assembly.

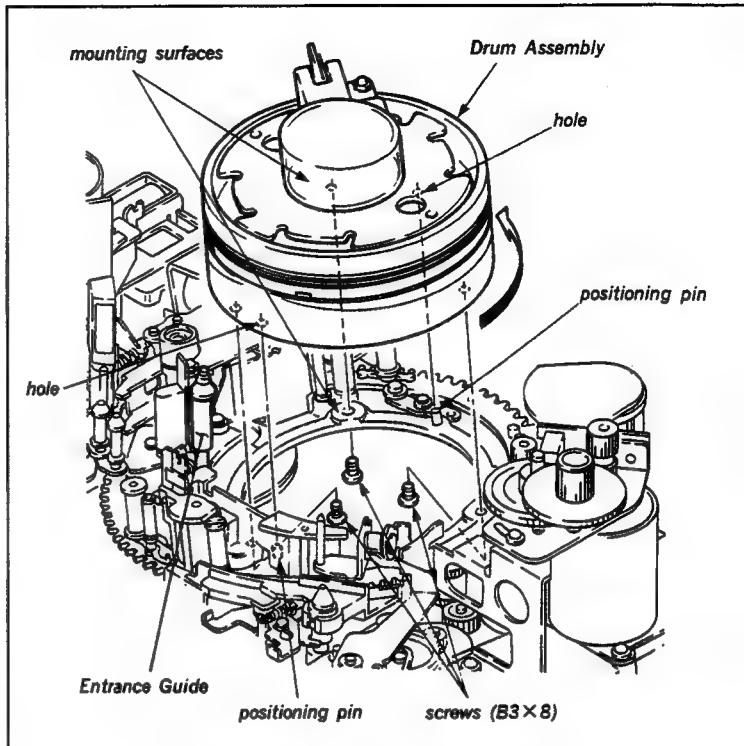


**Removal of the Drum Assembly**

### Installing procedure :

7. Clean the mounting surfaces of a new Drum Assembly and the drum mounting surface of a mechanical chassis with a cleaning piece moistened with cleaning fluid.
8. Install the new Drum Assembly.
  - (1) Align the holes shown in the figure of the Drum Assembly with two positioning pins of a mechanical chassis and thread three screws (B3 x 8) snugly but do not tighten.

**Caution : Be careful not to damage the tape running surface of the Upper Drum, the video heads, and the tape running and lead surfaces of the Lower Drum. Moreover, take care not to damage the tape guides around the Drum Assembly.**
  - (2) While turning the Drum Assembly in the direction indicated by the arrow as far as it will go and pushing it toward the Entrance Guide, then tighten three screws. (Tightening torque : 8 kg.cm)
  - (3) Check that there is no play between the Drum Assembly and the mechanical chassis.
9. Connect two connectors CN1 and CN2 to the Drum Assembly.
10. Fasten the drum harness with the harness clamer so that it does not touch the Drum Pulley.
11. Install the Drum Belt.  
(Refer to Sec. 3-6.)
12. Replace the unit to the horizontal position.
13. Connect the connector CN1 to the Brush Assembly.
14. Clean the tape running surface of the Drum Assembly.  
(Refer to Sec. 2-4-4.)



Installation of the Drum Assembly

**Adjustment procedure:**

15. Perform the Tape Run Alignment.
  - (1) Tracking Adjustment (Refer to Sec. 4-7.)
  - (2) CTL Head Position Adjustment (Refer to Sec. 4-9.)
  - (3) TC Head Position Adjustment (Refer to Sec. 4-12.)
  - (4) Switching Position Adjustment (Refer to Sec. 4-14.)
  
16. Perform the Video System Adjustment.  
(Refer to Sec. 8.)

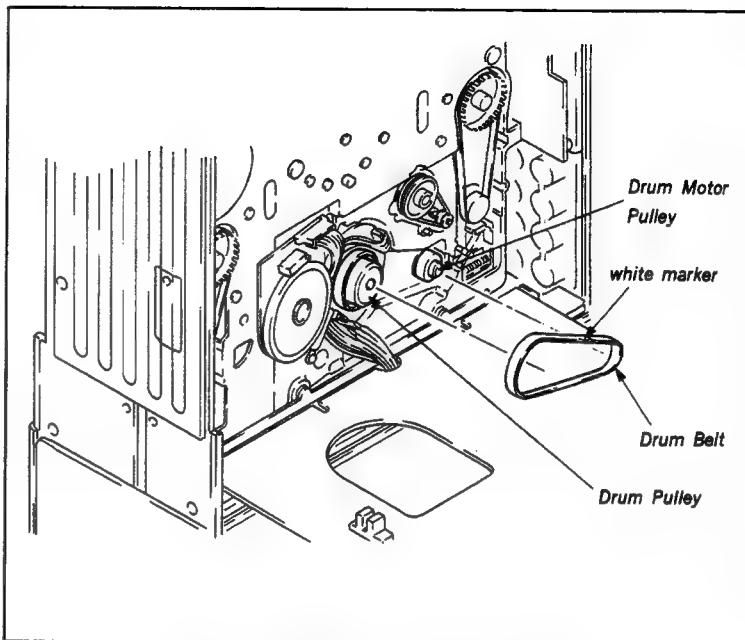
### 3-6. REPLACEMENT OF DRUM BELT

#### Removing procedure :

1. Place the unit with a Rear Panel Block side down.
2. Remove a Drum Belt from a Drum Pulley and Drum Motor Pulley.

#### Installing procedure :

3. Clean the following portions with a cleaning cloth moistened with cleaning fluid:
  - (1) Drum Pulley
  - (2) Drum Motor Pulley
  - (3) New Drum Belt
4. Hook the Drum Belt to the Drum Motor Pulley with its white marker outside.
5. While rotating the Drum Pulley clockwise by hand, hook the Drum Belt to the Drum Pulley.
6. Rotate the Drum Pulley clockwise by hand two or three turns and check that the Drum Belt is put in the center of the Drum Pulley and Drum Motor Pulley.



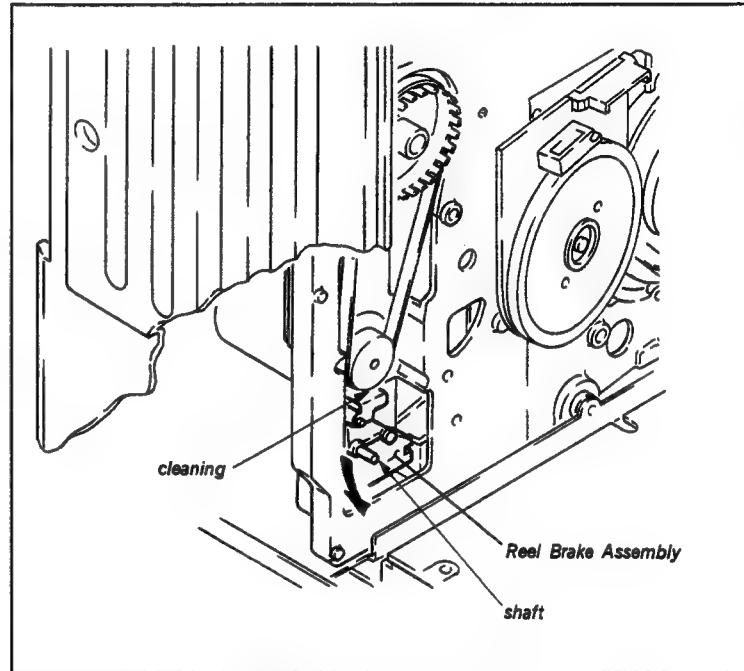
Removal/Installation of the Drum Belt

### 3-7. REPLACEMENT OF REEL BELT

- The replacement procedure of the Reel Belt is the same on the supply and take-up sides.

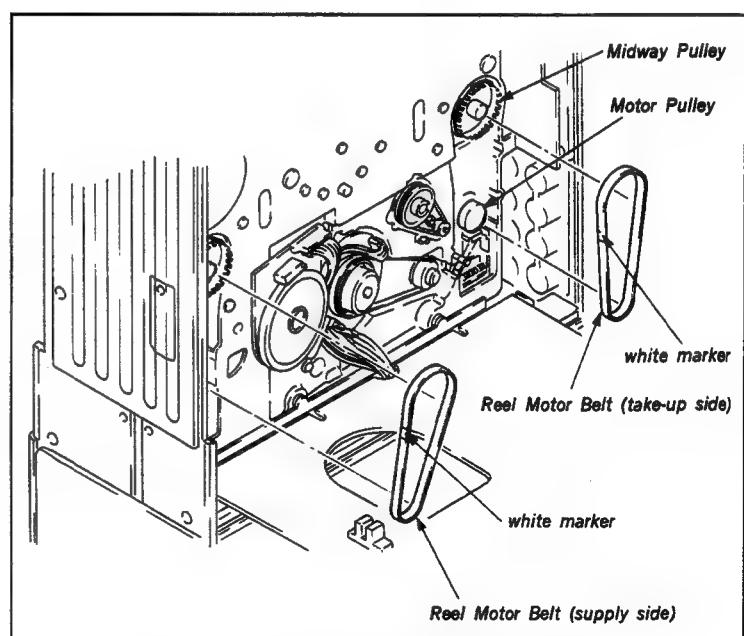
#### Removing procedure :

- Place the unit with a Rear Panel Block side down.
- Push the shaft shown in the figure of the Reel Brake Assembly in the direction indicated by the arrow, release the reel brake.
- Remove a Reel Belt from a Motor Pulley and Midway Pulley.



#### Installing procedure :

- Clean the following portions with a cleaning cloth moistened with cleaning fluid.
  - (1) Motor Pulley
  - (2) Midway Pulley
  - (3) New Reel Belt
  - (4) Surface of a Brake Arm Assembly which touches the Reel Belt
- Hook the Reel Belt to the Midway Pulley with its white marker outside.
- While releasing the reel brake and rotating the Motor Pulley by hand, hook the Reel Belt to the Motor Pulley.
- While releasing the reel brake and rotate the Midway Pulley by hand two or three turns, check that the Reel Belt is put in the center of the Motor Pulley and Midway Pulley.



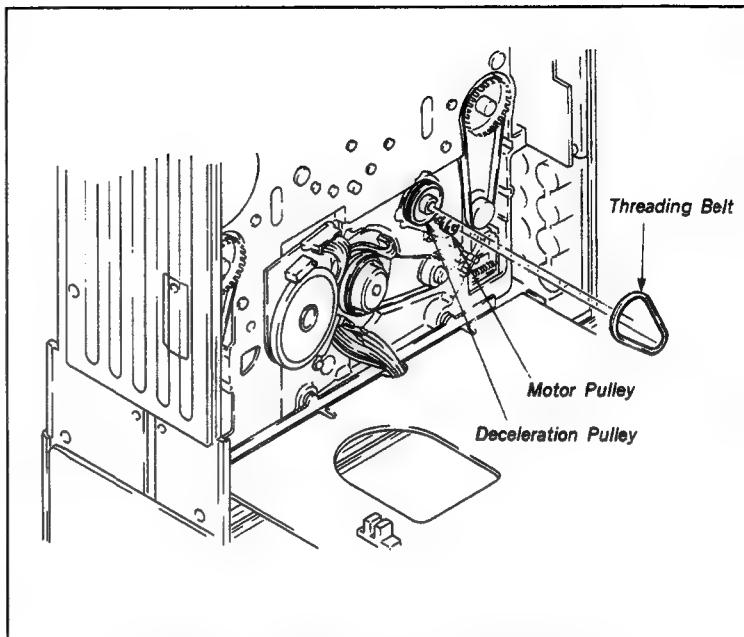
### 3-8. REPLACEMENT OF THREADING BELT

#### Removing procedure :

1. Place the unit with a Rear Panel Block side down.
2. Remove a Threading Belt from a Motor Pulley and Deceleration Pulley.

#### Installing procedure :

3. Clean the following portions with a cleaning cloth moistened with cleaning fluid.
  - (1) Motor Pulley
  - (2) Groove of Deceleration Pulley
  - (3) New Threading Belt
4. Hook the Threading Belt to the groove of the Deceleration Pulley.
5. While rotating the Motor Pulley by hand, hook the Threading Belt to the groove of the Motor Pulley.
6. Check that there is no twist in the Threading Belt.
7. Check that the Threading Belt does not slip off when the Deceleration Pulley is rotated by hand two or three turns.



Removal/Installation of the Threading Belt

### 3-9. REPLACEMENT OF PINCH ROLLER

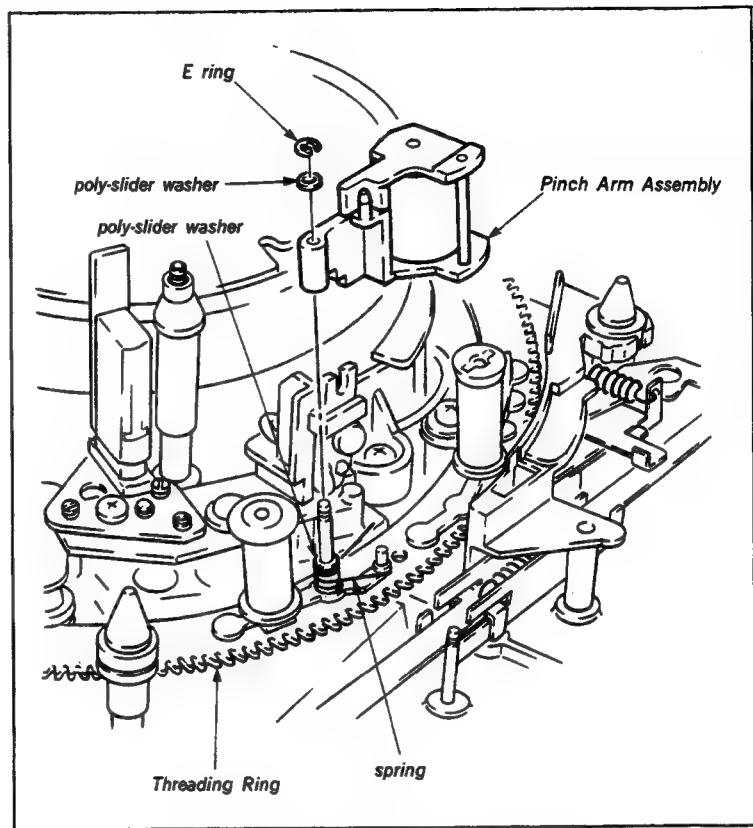
- Replace a Pinch Arm Assembly when a Pinch Roller is worn or damaged.

**Fixture :**

Thickness gauge

**Removing procedure :**

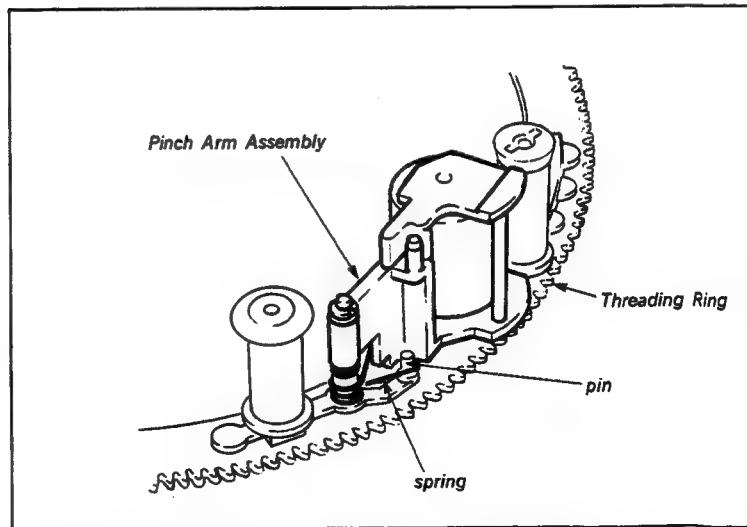
- Put the unit into the unthreading end mode.  
(Refer to Sec.3-1.)
  - Remove the E ring and poly-slider washer from the upper portion of the Pinch Arm.
  - Remove the Pinch Arm Assembly from the Threading Ring.
- Note:** Never remove the poly-slider washer and spring at the lower of the Pinch Arm.



Removal of the Pinch Arm Assembly

**Installing procedure:**

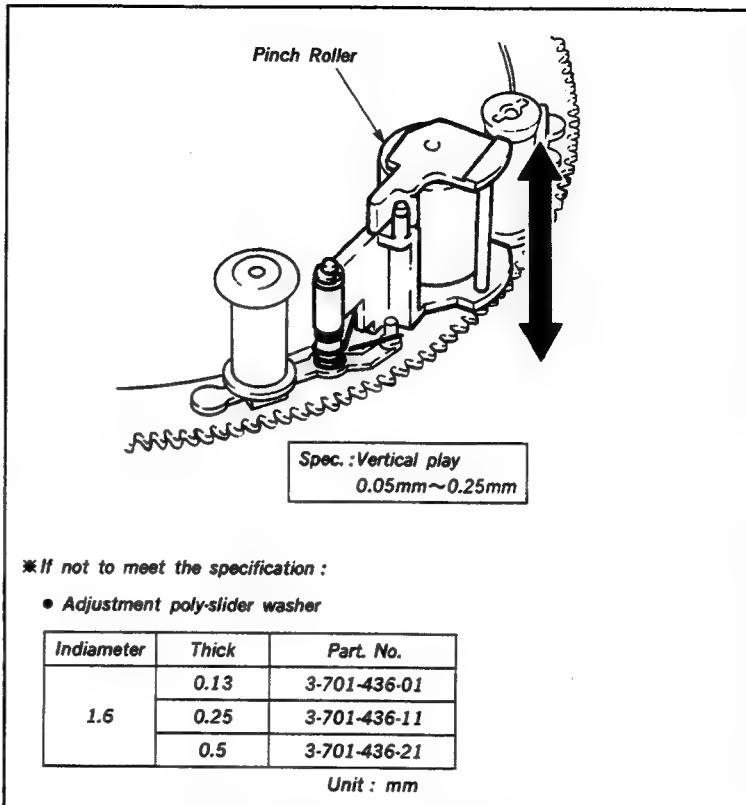
- Install a new Pinch Arm Assembly while putting the spring as shown in the figure.
- Note :** Install the spring so that the long lead of the spring is positioned to the white pin side of the Threading Ring and the short lead is positioned to the opposite side of the Pinch Arm.
- Insert the poly-slider washer at the upper portion of the Pinch Arm and secure it with the E ring.



Installation of the Pinch Arm Assembly

**Adjustment procedure:**

6. Perform the vertical play adjustment of the Pinch Roller.
  - (1) Hold the Pinch Roller Assembly by hand and move it in the vertical direction.  
Check that the vertical play meets the required specification.  
If the specification is met, perform step 7 and subsequent steps.  
If not, perform step (2), then step 7 and subsequent steps.
  - (2) When the above specification is not met:
    - ① Remove the E ring and install or remove the poly-slider washer at the upper portion of the Pinch Arm so that the vertical play meets the required specification.
    - ② Install the E ring and check that the specification is met again.
7. Rotate the Pinch Roller by hand two or three turns and check that it rotates smoothly.  
**Caution : Be careful not to damage the surface of the Pinch Roller.**



**Pinch Roller Vertical Play Adjustment**

8. Perform the Pinch Press Lever Height Adjustment.

- (1) Put the unit into the threading end mode.  
(Refer to Sec. 3-1.)
- (2) Push the iron core of a Pinch Solenoid slowly in the direction indicated by the arrow.

Check that the top and bottom plates of the Pinch Press Lever press the \*-marked portion of the Pinch Roller. (Spec. 1).

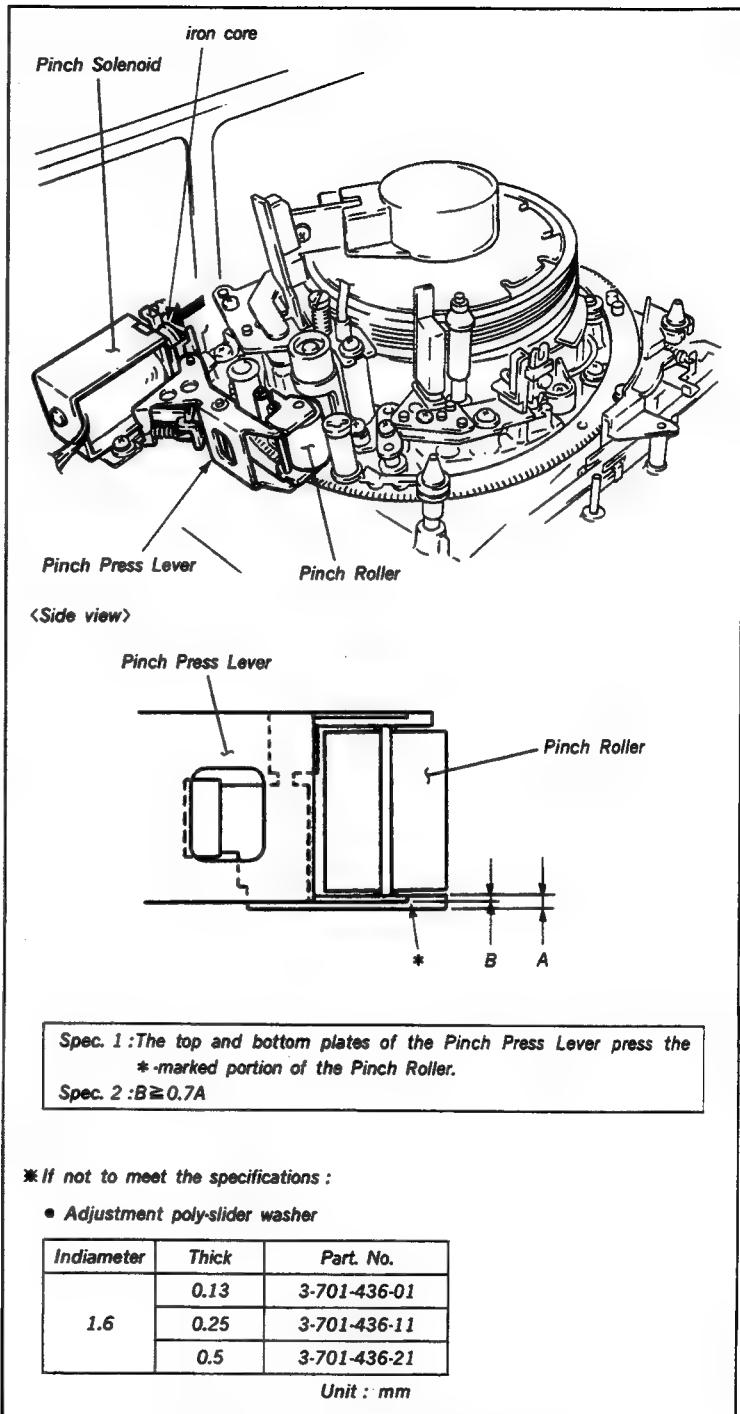
Check that the positional relationship between the Pinch Press Lever and the \*-marked portion of the Pinch Roller meets the required Spec. 2.

If Specs. 1 and 2 are met, perform step 9 and subsequent steps.

If not, perform step (3), then step 9 and subsequent steps.

(3) When the above specifications are not met:

- ① Put the unit into the unthreading end mode.  
(Refer to Sec. 3-1.)
- ② Adjust the poly-slider washer at the lower portion of the Pinch Arm so that the Specs.1 and 2 are met.
- ③ Perform the vertical play adjustment of the Pinch Roller again.



### Pinch Press Lever Height Adjustment

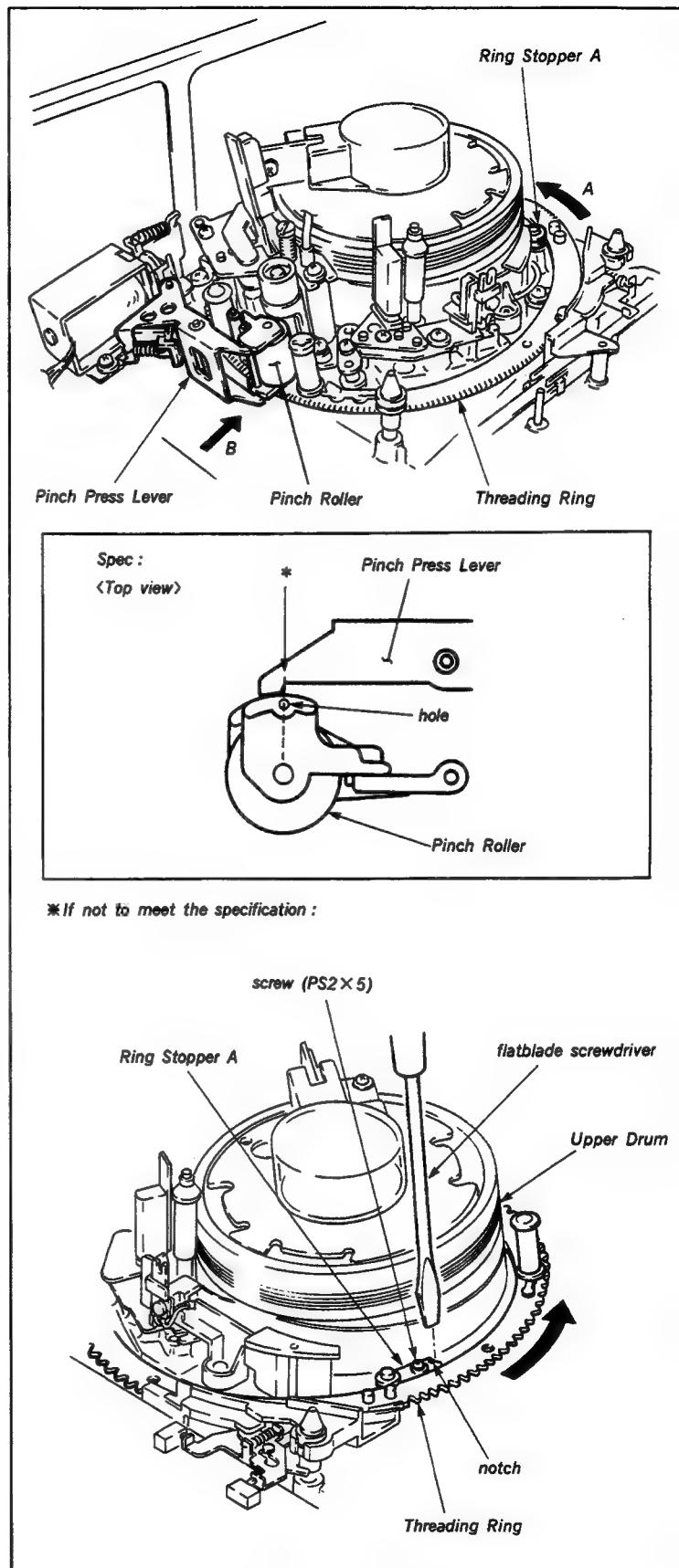
9. Perform the Threading End Position Adjustment.

- (1) Put the unit into the threading end mode.  
(Refer to Sec. 3-1.)
- (2) While pushing the Threading Ring in the direction indicated by the arrow A by hand, push the Pinch Press Lever in the direction indicated by the arrow B. At this time, check that the hole of the Pinch Roller and the \*-marked portion of the Pinch Press Lever are positioned as shown in the figure (Specification). If the specification is met, perform step 11 and subsequent steps. If not, perform step (3), then step 10 and subsequent steps.

- (3) When the above specification is not met :
  - ① Loosen a fixing screw (PS2 x 5) of Ring Stopper A about 1/2 to one turn.
  - ② While pushing the Threading Ring in the direction indicated by the arrow by hand, insert a flatblade screwdriver into the notch of a Ring Stopper A and adjust the position of the Ring Stopper A so that it meets the required specification.

**Caution : Be careful not to damage the tape running surface of the Upper Drum, the video head, and the tape running and lead surfaces of the Lower Drum when inserting the flatblade screwdriver.**

- ③ Repeat the unthreading and threading two or three times and check that the required specification is met.



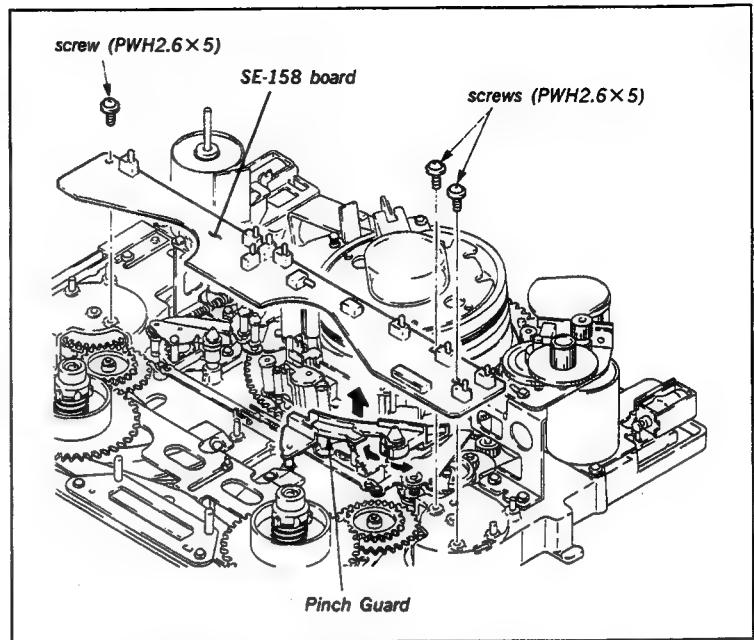
Threading End Position Adjustment

10. Perform the Stopper Lever B Position Adjustment.

**Note:** Perform this check or adjustment only when the position of the Ring Stopper A is adjusted in step 9.

- (1) Put the unit into the threading end mode.  
(Refer to Sec. 3-1.)
- (2) Remove three screws (PWH2.6 x 5), then remove SE-158 board.
- (3) Pull out a Pinch Guard.

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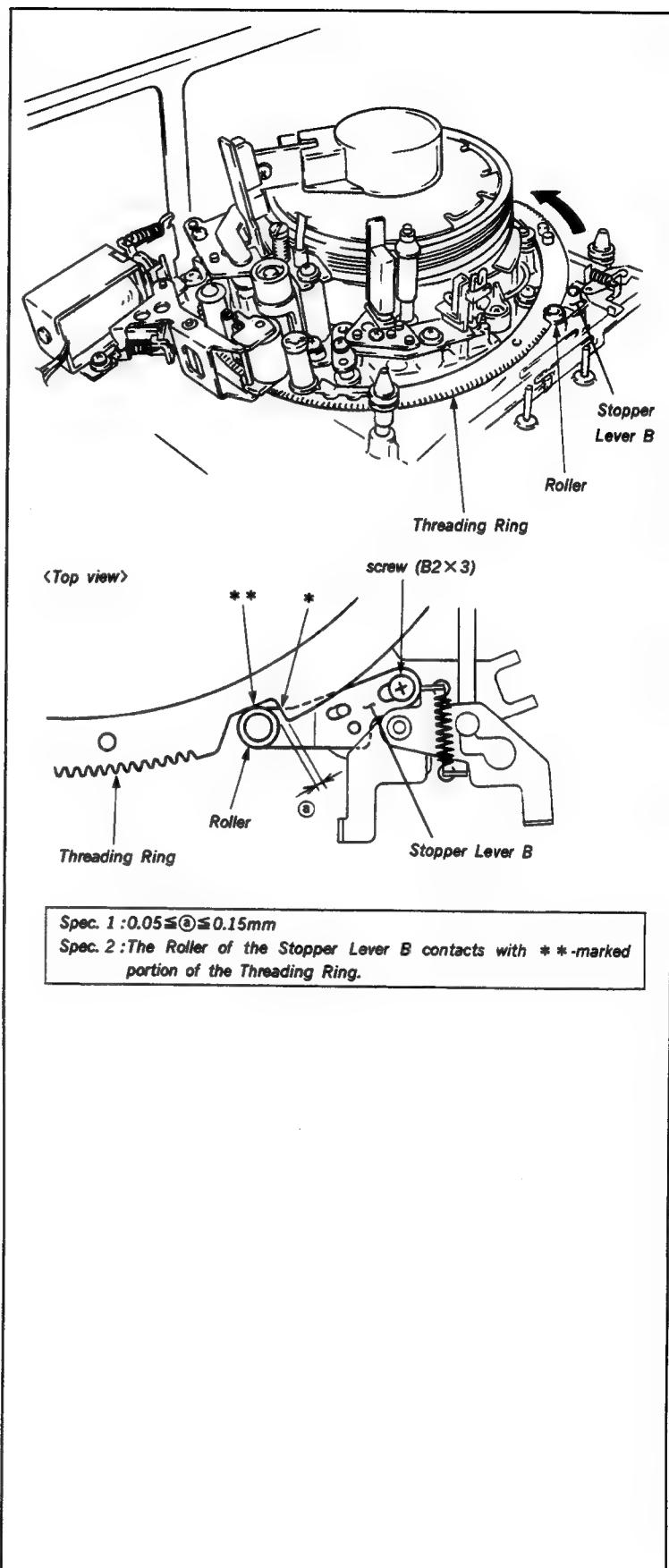
Removal of SE-158 Board and Pinch Guard

- (4) While pushing the Threading Ring in the direction indicated by the arrow by hand, check that the clearance between the \* -marked portion of the Threading Ring and the Roller of a Stopper Lever B meets the required Spec.1.

Check that the Roller of the Stopper Lever B contacts with the \*\* -marked portion of the Threading Ring (Spec. 2). If Specs. 1 and 2 are met, perform step (6) and subsequent steps.

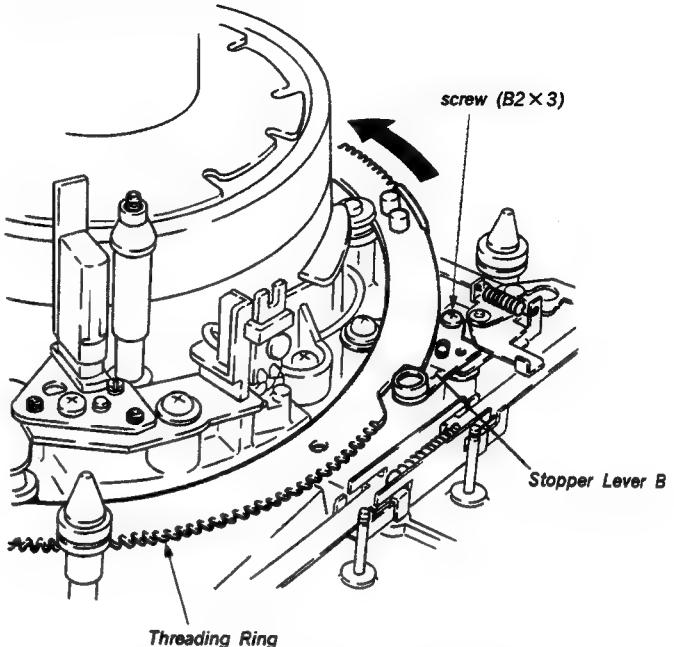
If not, perform step (5), then step (6) and subsequent steps.

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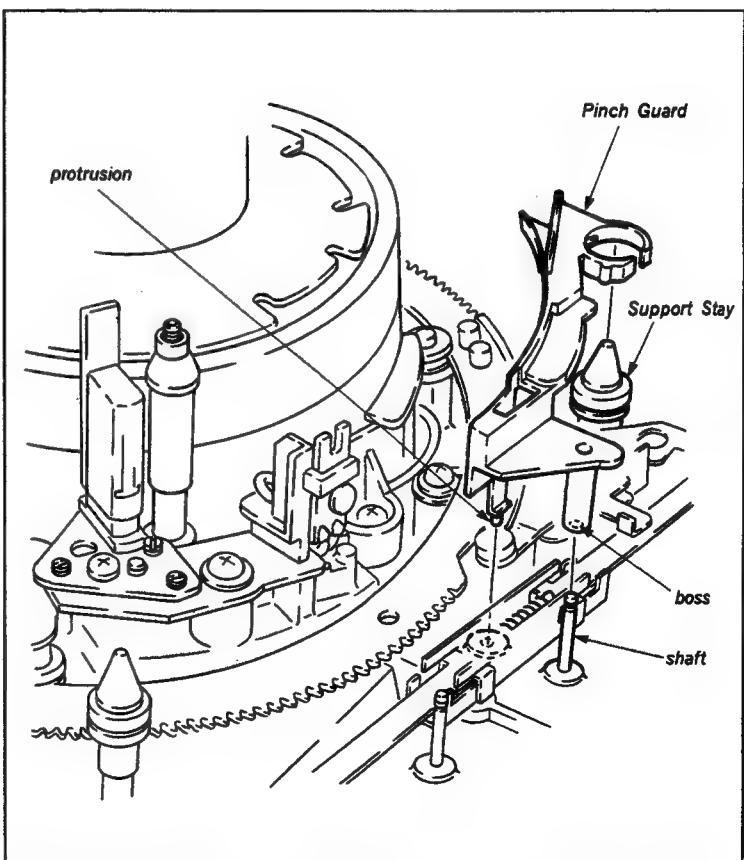
- (5) When the above specifications are not met :
  - ① Loosen a fixing screw (B2 x 3) of the Stopper Lever B about 1/2 to one turn.
  - ② While pushing the Threading Ring in the direction indicated by the arrow by hand, adjust the position of the Stopper Lever B so that it meets required Specs. 1 and 2.
  - ③ Repeat the unthreading and threading two or three times and check that Specs. 1 and 2 are met.
- (6) Put the unit into the threading end mode.  
(Refer to Sec. 3-1.)

\*If not to meet the specifications :



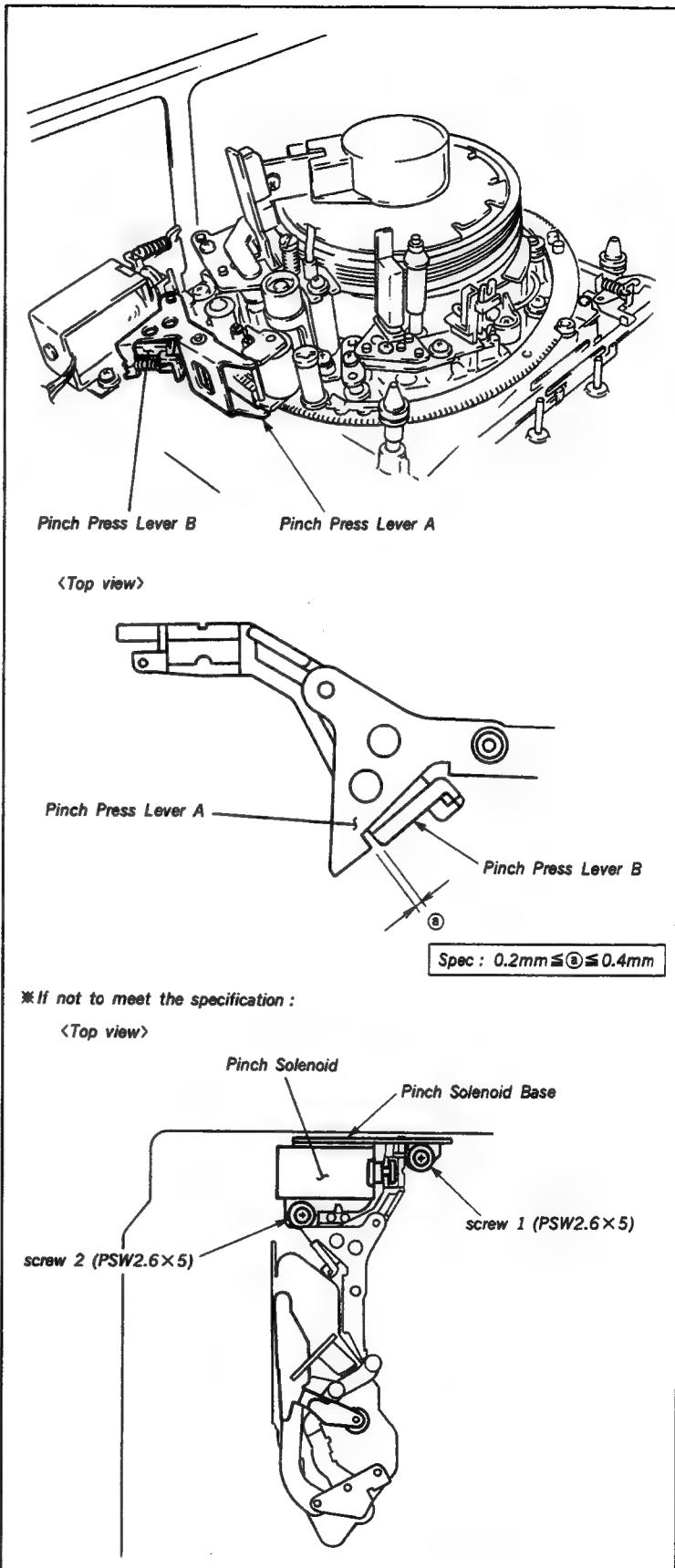
Stopper Lever B Position Adjustment

- (7) Fit the boss and protrusion of the Pinch Guard with the shaft and hole of a mechanical chassis and push the Pinch Guard into a Support Stay until it is locked.
- (8) Fix SE-158 board with three screws (PWH2.6 x 5).



Installation of the Pinch Guard

11. Perform the Pinch Press Lever Position Adjustment.
  - (1) Turn the power on.
  - (2) Press the PLAY button without a cassette tape.
  - (3) Check that the clearance between the Pinch Press Levers A and B meet the required specification.  
If the specification is met, perform step (5) and subsequent steps.  
If not, perform step (4), then step (5) and subsequent steps.
  - (4) When the above specification is not met :
    - ① Insert a flatblade screwdriver into the notch of a Pinch Solenoid Base and adjust the position of the Pinch Solenoid so that the clearance meets the required specification.  
When the specification is met, tighten the screw 1 while keeping the flatblade screwdriver inserted into the notch.
    - ② Pull out the flatblade screwdriver from the notch and tighten the screw 2.
    - ③ Check that the clearance meets the required specification again.
  - (5) Repeat the unthreading and threading two or three times and check that the specification is met.
  - (6) Turn the power off.
  
12. Clean the surface of the Pinch Roller with a cleaning cloth moistened with cleaning fluid.
  
13. Perform the Tape Run Adjustment.  
(Refer to Sec. 4-2.)

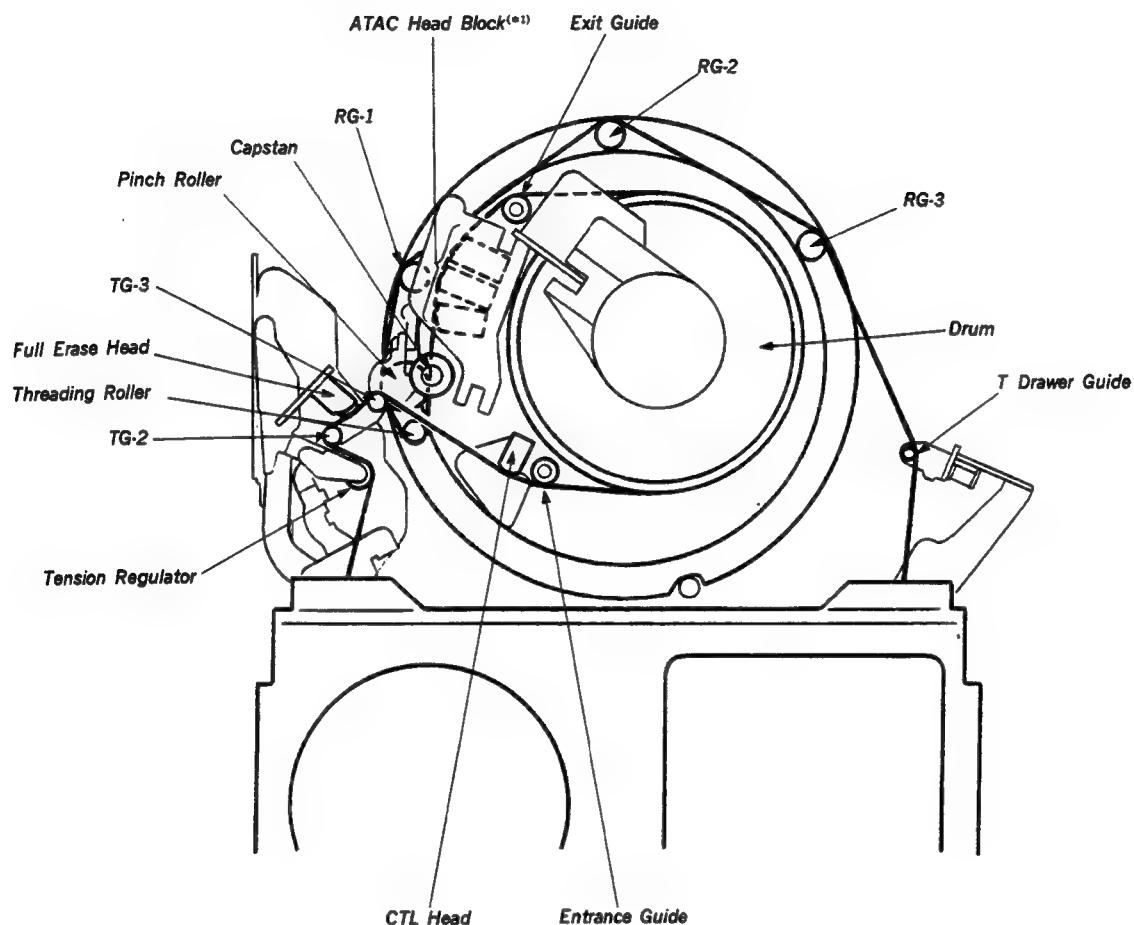


Pinch Press Lever Position Adjustment

## SECTION 4 TAPE RUN ALIGNMENT

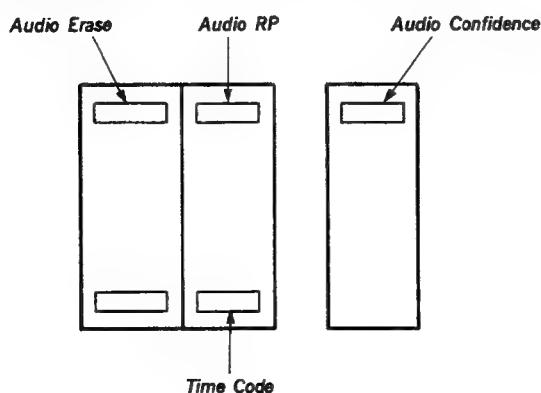
### 4-1. GENERAL INFORMATION FOR TAPE RUN ALIGNMENT

#### 1. The location of tape running system



(\* 1) ATAC Head Block :

The ATAC Head Block is composed by an Audio Erase Head, Audio RP Head, Time Code (TC) Head and Audio Confidence Head.



## 2. Alignment tape

Alignment tape, CR2-1B PS (8-960-096-51)

For use:

- Tracking adjustment
- CTL Head position adjustment
- TC Head position adjustment
- Switching position adjustment
- CTL delay adjustment

Contents:

VIDEO TRACK	AUDIO TRACK	TIME CODE TRACK	CTL TRACK
Y ; 4MHz signal C ; 5MHz signal	—	CTL	CTL

Alignment tape, CR8-1A PS (8-960-098-45)

Contents:

TIME min. sec	AUDIO TRACK	VIDEO TRACK	CTL TRACK	For Use
00 : 00	1kHz, OVU	—	CTL	reference level (Audio Head Phase Adj.)
02 : 55	Blank	—	CTL	
03 : 00	10kHz, -10VU	—	CTL	Audio Head Phase Adj.
04 : 55	Blank	—	CTL	
05 : 00	1kHz, -20VU	—	CTL	
05 : 55	Blank	—	CTL	
06 : 00	40Hz, -20VU 7kHz, -20VU 10kHz, -20VU 15kHz, -20VU	—	CTL	Audio PB Frequency Response Adj.
07 : 55	Blank	—	CTL	
08 : 00	1kHz, 0VU	—	1kHz Sine Wave	Audio Head Height Adj. CTL Head Height Adj.
10 : 00				

## 3. Cleaning

Perform the cleaning in accordance with Section 2-4 before checking and adjusting the tape running system.

## 4-2. TAPE RUN ADJUSTMENT

- This section explains how to check the tape running condition around the Pinch Roller.

### Fixture :

Cassette tape (Never use an alignment tape.)

### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert a cassette tape, and put a weight not to rise up the cassette tape.
3. Put the unit into the PLAY mode.  
Check that the tape running condition between the ATAC Head Block and Capstan Shaft meet the required specifications 1 to 3.
4. Put the unit into PAUSE and PLAY modes two or three times every two or three seconds, and check the tape running condition between the ATAC Head Block and Capstan Shaft meet the required specifications 1 to 3.
5. If the specifications are not met, perform the following checks or adjustments.
  - (1) ATAC Head Block Zenith Adjustment  
(Refer to Sec.4-6.)
  - (2) Vertical Play Adjustment of the Pinch Roller (Refer to step 6 of Sec.3-9.)
  - (3) Pinch Press Lever Height Adjustment  
(Refer to step 8 of Sec.3-9.)
  - (4) Threading End Position Adjustment  
(Refer to step 9 of Sec.3-9.)
  - (5) Stopper Lever B Position Adjustment  
(Refer to step 10 of Sec.3-9.)
  - (6) Pinch Press Lever Position Adjustment  
(Refer to step 11 of Sec.3-9.)
6. Repeat the above steps 3 and 4, check that the tape running condition between the ATAC Head Block and Capstan Shaft meet the required specifications 1 to 3 again.  
If not, replace the Pinch Roller. (Refer to Sec.3-9.)

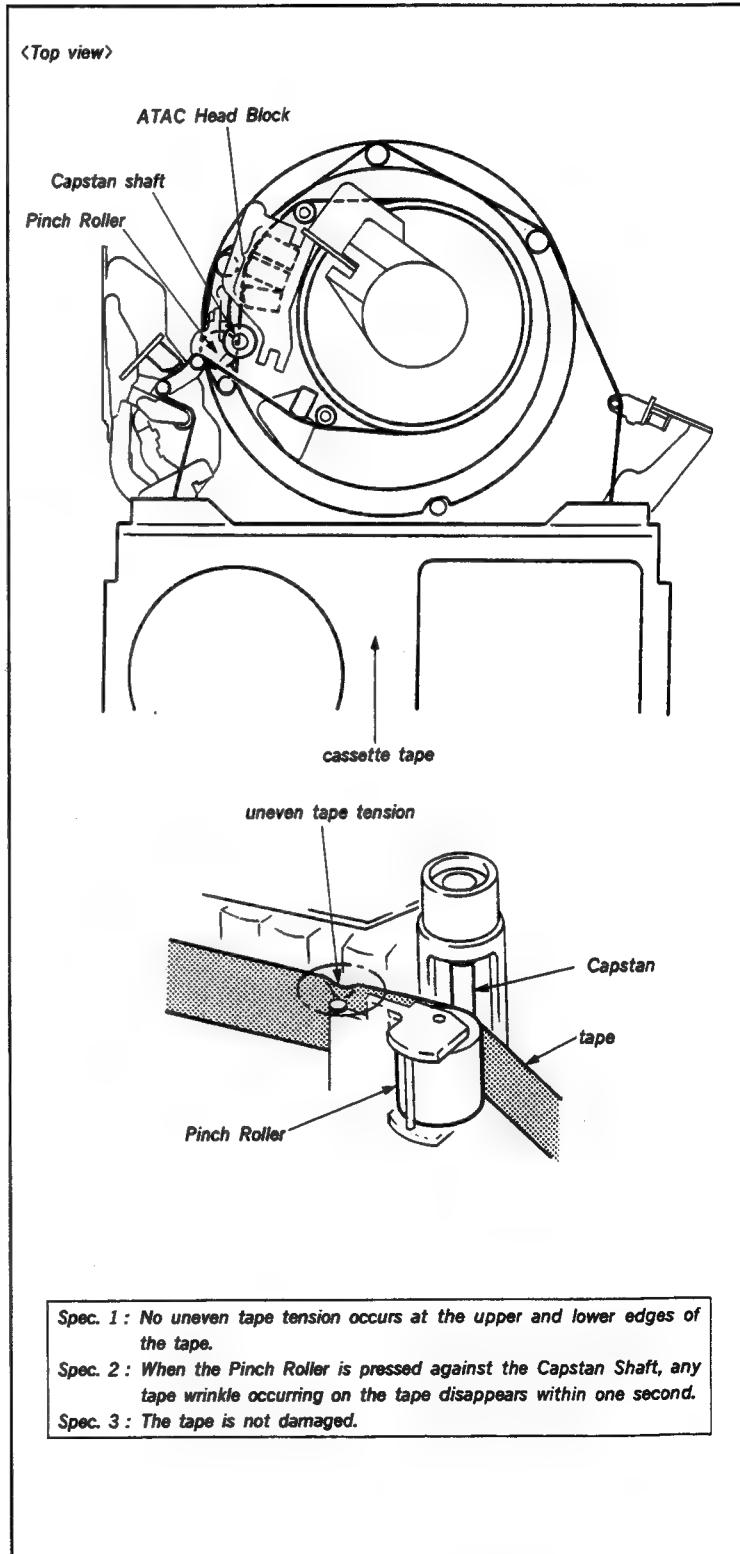


Fig. 4-2-1. Tape Run Adjustment

#### 4-3. TENSION REGULATOR ROLLER SLANT/HEIGHT ADJUSTMENT

**Fixture :**

Cassette reference plate (L)  
 Tension regulator slantness check tool  
 Thickness gauge  
 Cleaning fluid

**Check procedure :**

1. Turn the knob of Manual Driving Gear in the clockwise direction while pressing down it so that the Pinch Roller is in front of the Threading Motor.

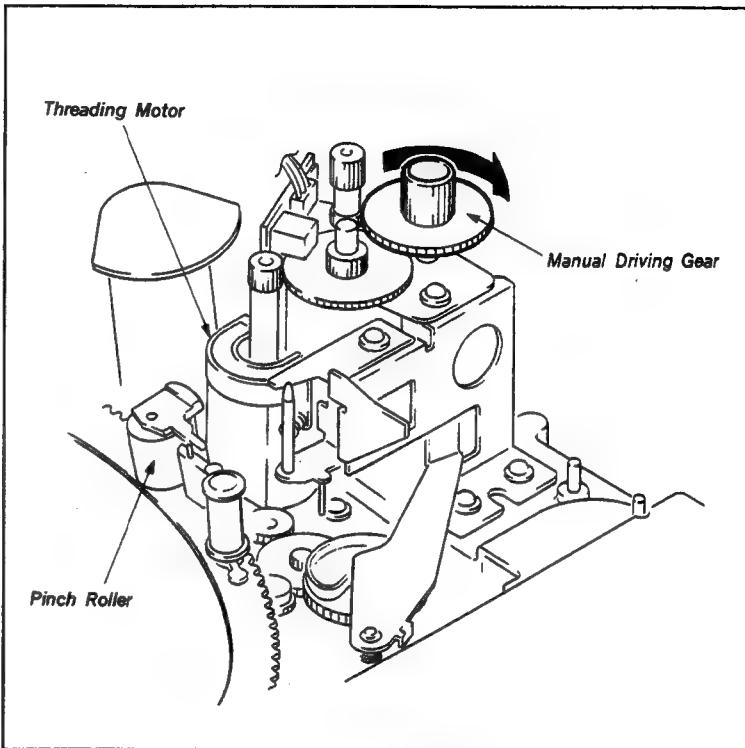


Fig. 4-3-1. Mode

2. Install the Cassette Reference Plate (L).
  - (1) Put both S and T Reel Table Assemblies into the intermediate position between L and S cassette positions.  
 (Refer to Sec.3-1.)
  - (2) Install the Cassette Reference Plate (L) at the position for the cassette.
  - (3) While pushing the Cassette Reference Plate (L) marked (a) and (b), check that there is no play. If there is play, turn the adjustment screw so that there is no play. Similarly, check that there is no play at marked (c) and (d).

**Note :** Check that there is no play at marked (a), (b), (c) and (d).

3. Clean the upper surface of the Cassette Reference Plate (L) and the adjustment surface of the Tension Regulator Slantness Check Tool with a cleaning cloth moistened with cleaning fluid.

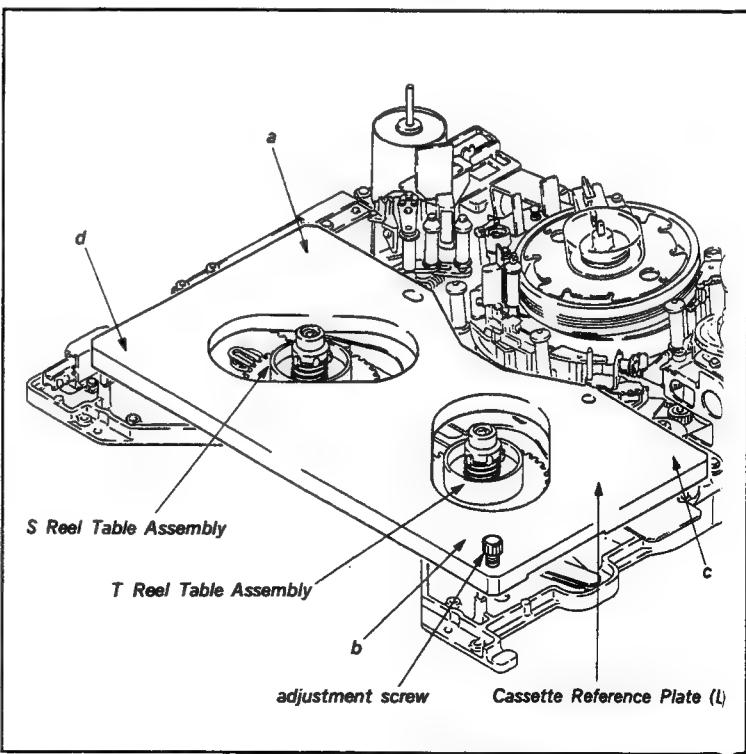


Fig. 4-3-2. Installation of the Cassette Reference Plate (L)

4. Perform the Tension Regulator Roller Slant Check.

- (1) Place the \* marked surface of the Tension Regulator Slantness Check Tool lightly against the Tension Regulator Roller from the direction indicated by arrow A. Check that the slantness of the Tension Regulator Roller meets the required specification 1.
- (2) Place the \*\* marked surface of the Tension Regulator Slantness Check Tool lightly against the Tension Regulator Roller from the direction indicated by arrow B. Check that the slantness of the Tension Regulator Roller meets the required specification 2.
- (3) If the specifications 1 and 2 are not met, turn the screws ① and ② shown in the figure so that the required specifications are met.

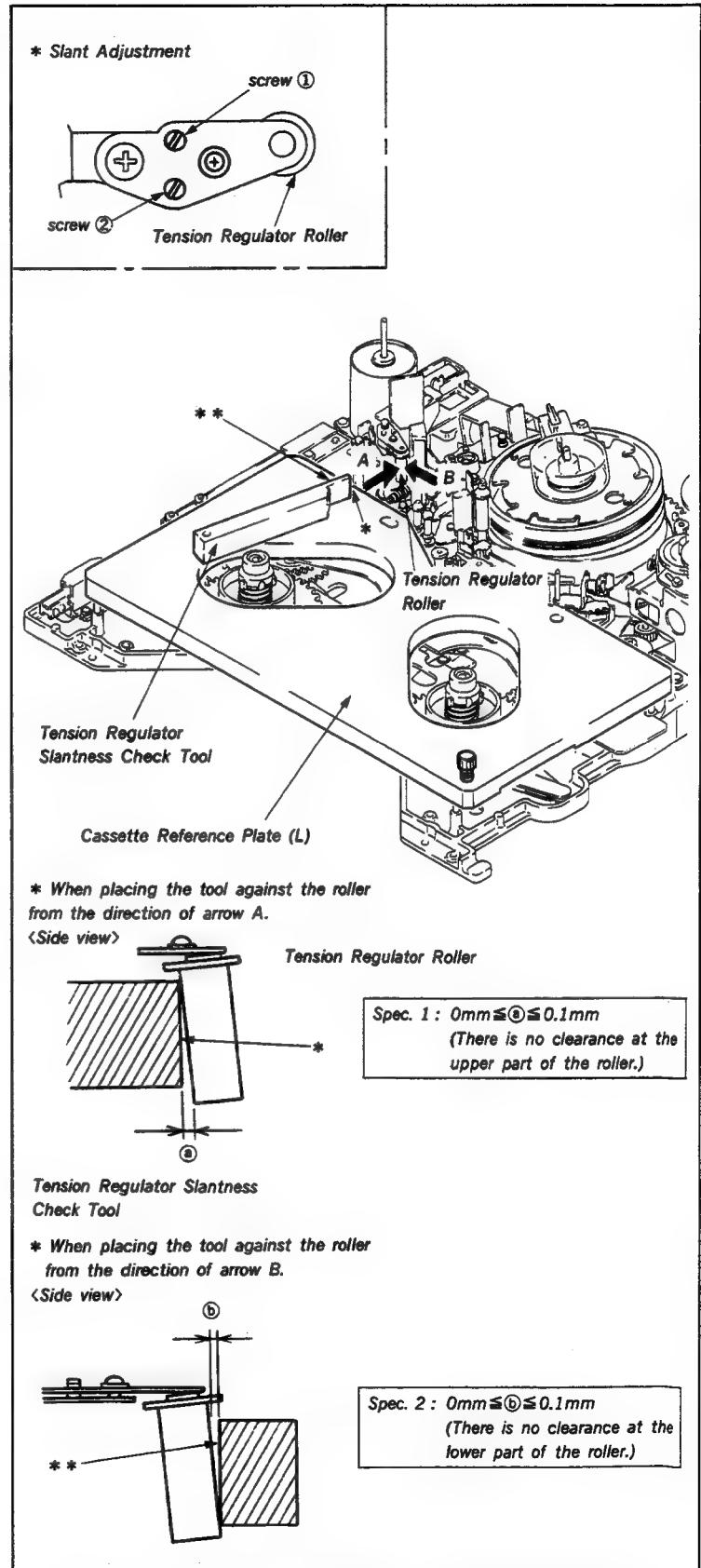


Fig. 4-3-3. Tension Regulator Roller Slant Check

5. Perform the the Tension Regulator Roller Height Check.
  - (1) Insert a thickness gauge (0.5 mm thickness) between the Tension Regulator Slantness Check Tool and Cassette Reference Plate (L).
  - (2) Place the \*\* marked surface of the Tension Regulator Slantness Check Tool lightly against the Tension Regulator Roller in the state of step (1). Check that the height of the Tension Regulator Roller meets the required specification 3.
  - (3) Remove the thickness gauge (0.5 mm thickness) and insert the thickness gauge (0.9mm thickness).
  - (4) Place the \*\* marked surface of the Tension Regulator Slantness Check Tool lightly against the Tension Regulator Roller in the state of step (3). Check that the height of the Tension Regulator Roller meets the required specification 4.
  - (5) If the specifications 3 and 4 are not met, turn the screws ①, ② and ③ shown in the figure so that the required specifications are met.
  - (6) Check the slantness of the Tension Regulator Roller again.

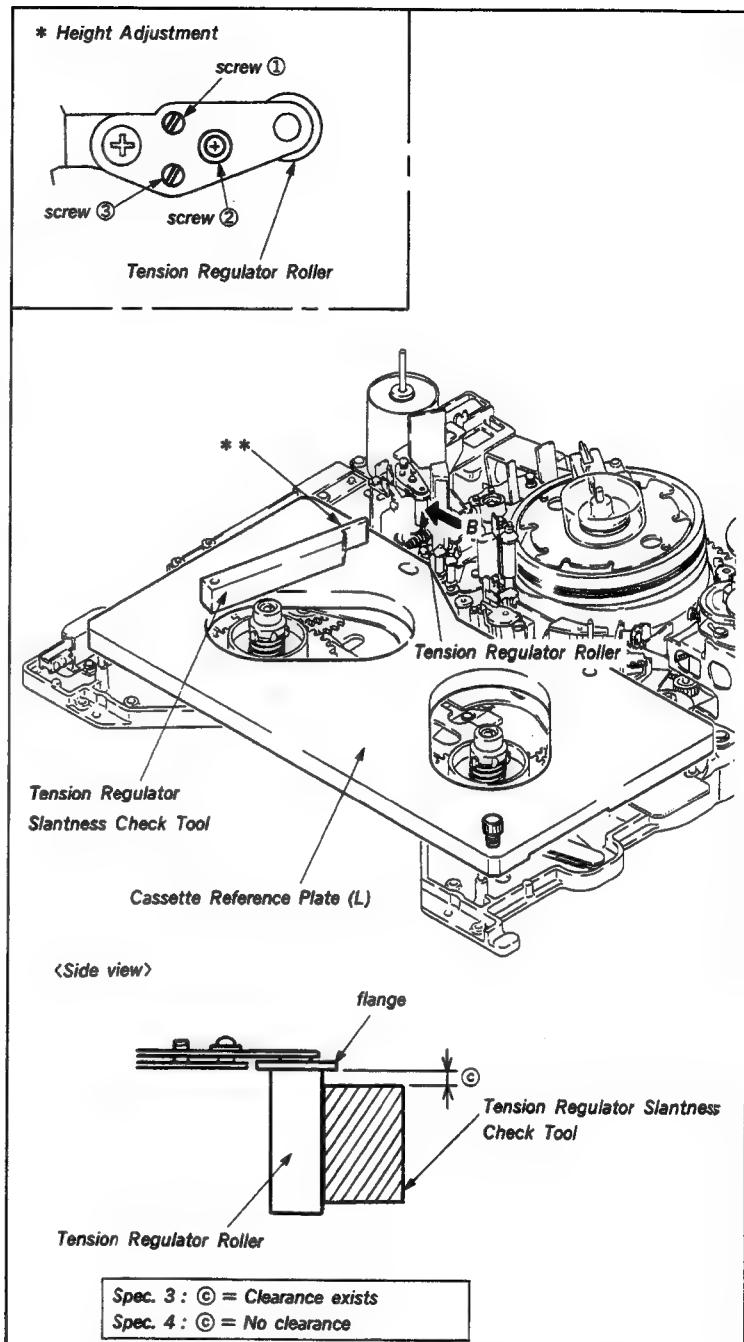


Fig. 4-3-4. Tension Regulator Roller Height Check

#### 4-4. TAPE GUIDE HEIGHT ADJUSTMENT

**Height adjustment procedure of the tape guide :**

- (1) Put the flatblade of the tape guide adjustment driver in the (-)slot of the upper flange.
- (2) Loosen a locking screw one to three turns.
- (3) Turn the adjustment driver and adjust the height of the tape guide.
- (4) After adjustment is completed, tighten the locking screw.

**Fixture :**

Cassette reference plate (L)  
Tension regulator slantness check tool  
Tape guide adjustment driver  
Small mirror  
Cassette tape (Never use an alignment tape.)  
Cleaning fluid

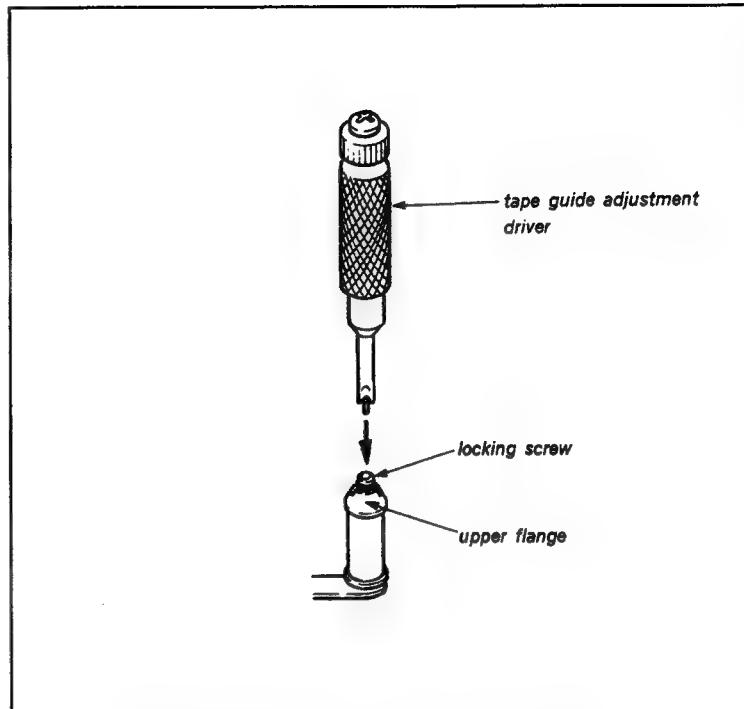


Fig. 4-4-1. Tape Guide Height Adjustment

**Check procedure :**

1. Turn the knob of Manual Driving Gear in the clockwise direction while pressing down it so that the Pinch Roller is in front of the Threading Motor.

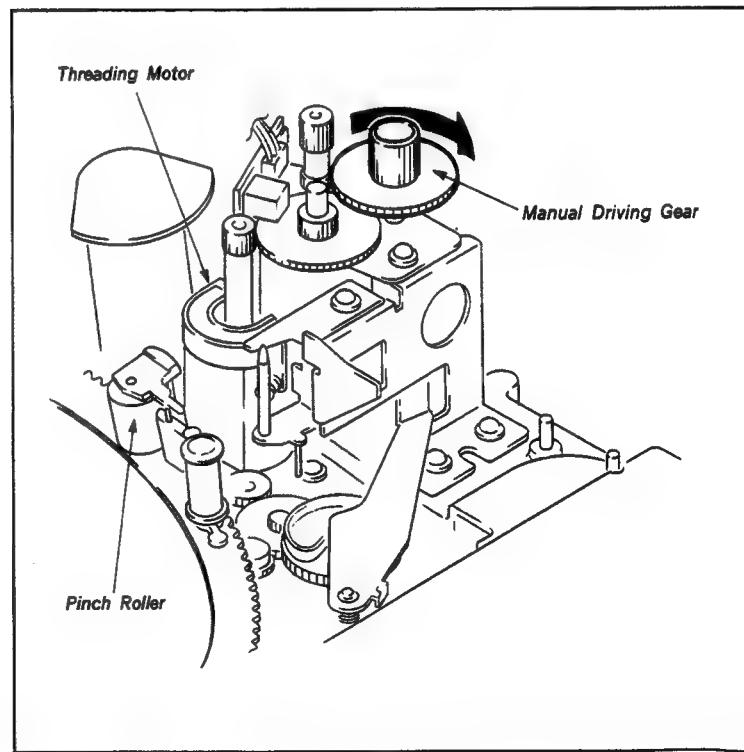


Fig. 4-4-2. Mode

2. Install the Cassette Reference Plate (L).
  - (1) Put both S and T Reel Table Assemblies into the intermediate position between L and S cassette positions.  
(Refer to Sec.3-1.)
  - (2) Install the Cassette Reference Plate (L) at the position for the cassette.
  - (3) While pushing the Cassette Reference Plate (L) marked (a) and (b), check that there is no play. If there is play, turn the adjustment screw so that there is no play. Similarly, check that there is no play at marked (c) and (d).

**Note :** Check that there is no play at marked (a), (b), (c) and (d).
3. Clean the upper surface of the Cassette Reference Plate (L) and the adjustment surface of the Tension Regulator Slantness Check Tool with a cleaning cloth moistened with cleaning fluid.

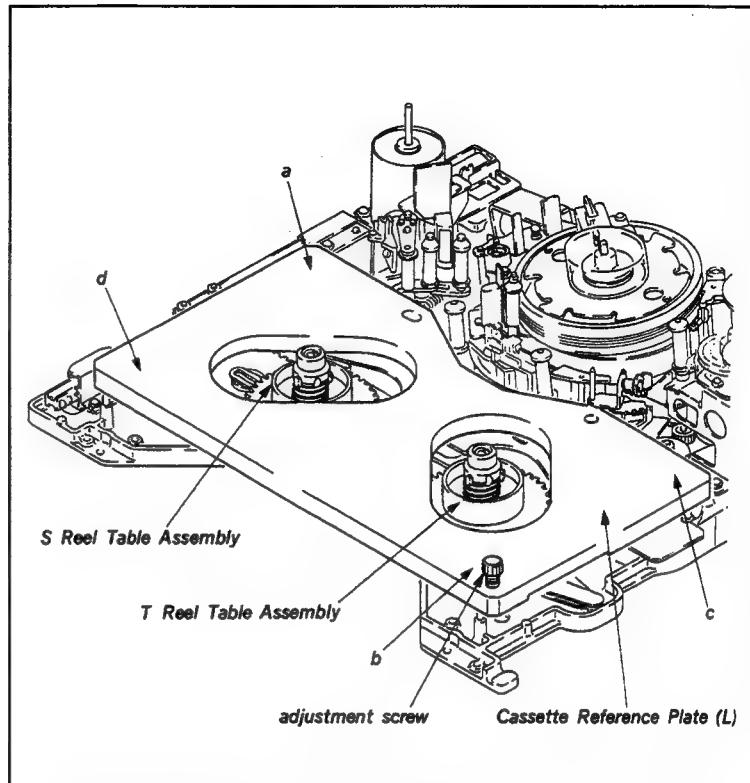


Fig. 4-4-3. Installation of the Cassette Reference Plate (L)

4. Perform the TG-3 Height Check.

- (1) Place the Tension Regulator Slantness Check Tool lightly against the TG-3 from the direction as shown in the figure. Check that the height of the upper flange meets the required specification.
- (2) If the specification is not met, adjust the height of the upper flange.

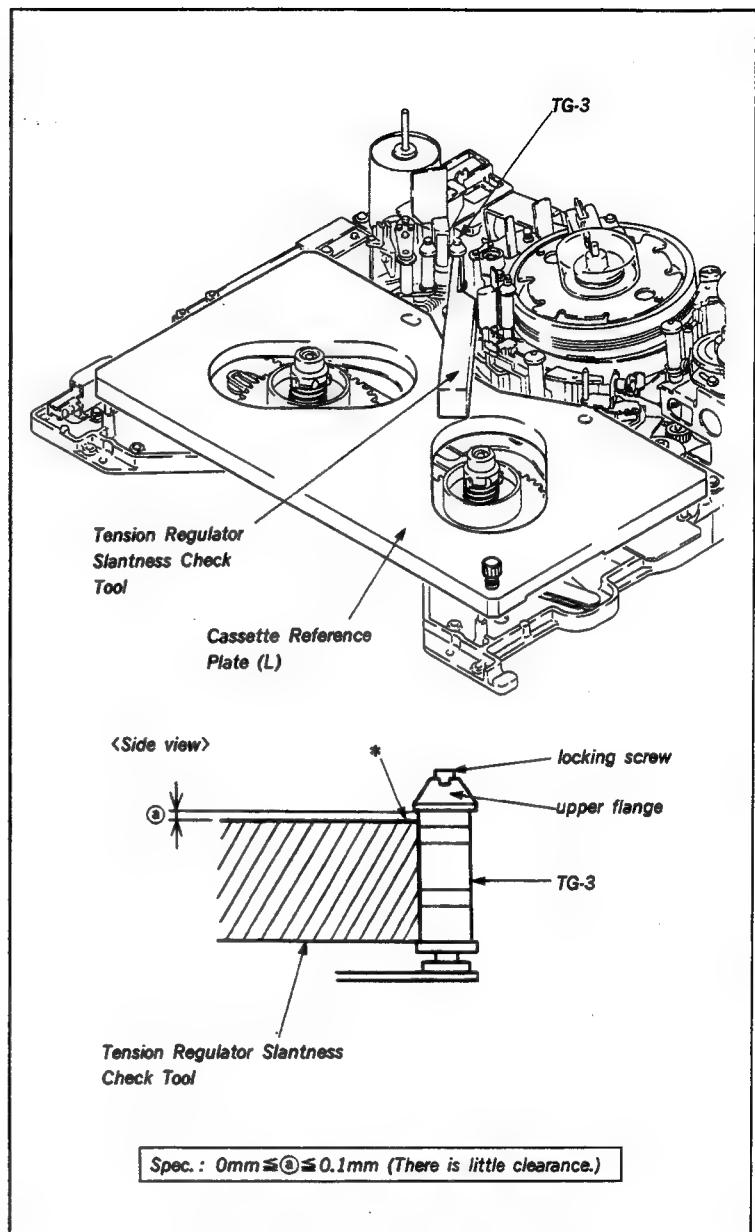


Fig. 4-4-4. TG-3 Height Check

5. Perform the TG-2 Height Check.
  - (1) Place the Tension Regulator Slantness Check Tool lightly against the TG-2 from the direction as shown in the figure. Check that the height of the upper flange meets the required specification 1.
  - (2) Insert a cassette tape, and put a weight not to rise up the cassette tape.
  - (3) Put the unit into the PLAY mode. Adjust the height of the upper flange so that the specification 2 is met.
6. Perform the tape running check in accordance with Section 4-7-3.

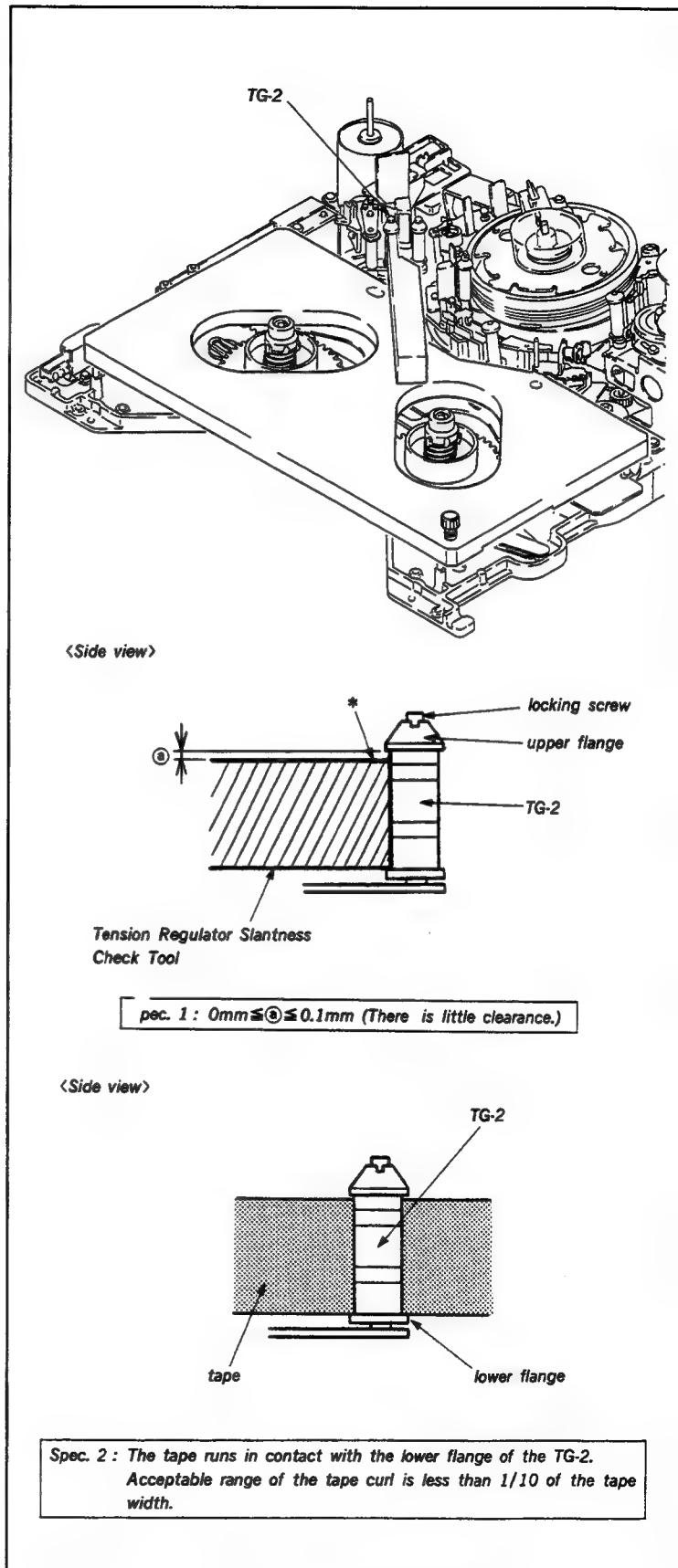


Fig. 4-4-5. TG-2 Height Check

## 4-5. CTL HEAD ZENITH/AZIMUTH ADJUSTMENT

### 4-5-1. CTL Head Zenith/Azimuth Check

#### Fixture :

Cassette reference plate (L)  
Tension regulator slantness check tool  
Thickness gauge  
Cleaning fluid

#### Check procedure :

- Turn the knob of Manual Driving Gear in the clockwise direction while pressing down it so that the Pinch Roller is in front of the Threading Motor.

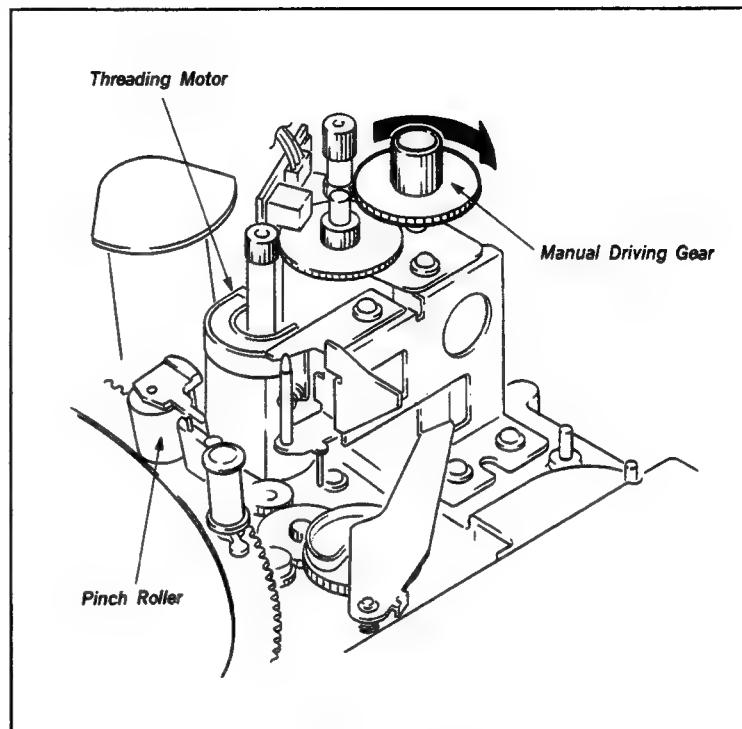


Fig. 4-5-1. Mode

- Install the Cassette Reference Plate (L).
  - Put both S and T Reel Table Assemblies into the intermediate position between L and S cassette positions.  
(Refer to Sec.3-1.)
  - Install the Cassette Reference Plate (L) at the position for the cassette.
  - While pushing the Cassette Reference Plate (L) marked (a) and (b), check that there is no play. If there is play, turn the adjustment screw so that there is no play. Similarly, check that there is no play at marked (c) and (d).

**Note : Check that there is no play at marked (a), (b), (c) and (d).**
- Clean the upper surface of the Cassette Reference Plate (L) and the adjustment surface of the Tension Regulator Slantness Check Tool with a cleaning cloth moistened with cleaning fluid.

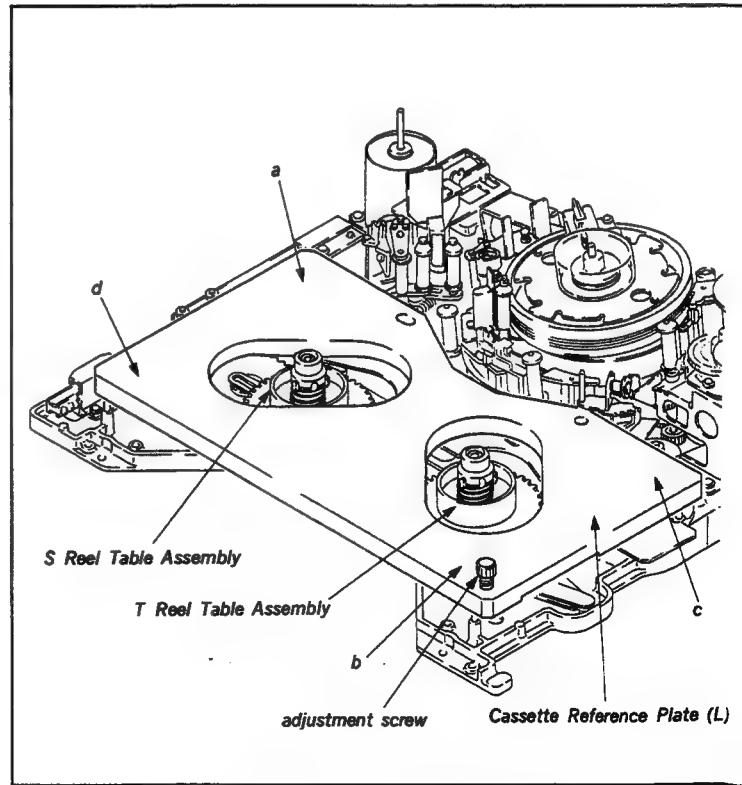


Fig. 4-5-2. Installation of the Cassette Reference Plate (L)

4. Perform the zenith check.
  - (1) Place the \* marked surface of the Tension Regulator Slantness Check Tool lightly against the front surface of the CTL Head from the direction indicated by arrow A.  
**Caution : Be careful not to damage the CTL Head.**
  - (2) Check that the clearance between the CTL Head and check tool meets the required specification 1.
  
5. Perform the azimuth check.
  - (1) Place the \*\* marked surface of the Tension Regulator Slantness Check Tool lightly against the right side surface of the CTL Head from the direction indicated by arrow B.
  - (2) Check that the clearance between the CTL Head and check tool meets the required specification 2.
  
6. If the specifications 1 and 2 are not met, adjust the zenith and azimuth of the CTL Head in accordance with Section 4-5-2.

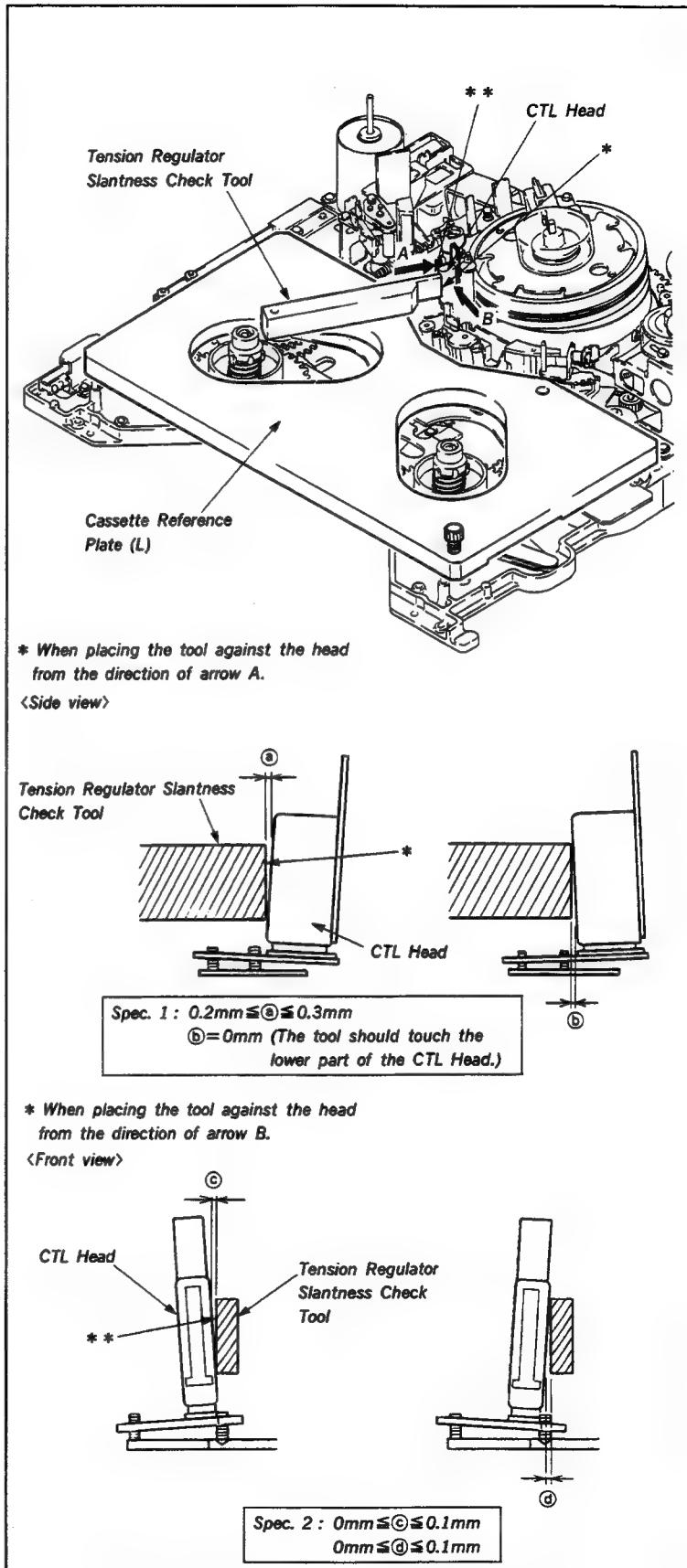


Fig. 4-5-3. CTL Head Zenith/Azimuth Check

#### 4-5-2. CTL Head Zenith/Azimuth Adjustment

##### Fixture :

Cassette reference plate (L)  
Tension regulator slantness check tool  
Thickness gauge

When specification 1 is not met (zenith adjustment) :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the zenith adjustment screw so that the required specification is met.
  - If there is a clearance at the upper part of the CTL Head:  
...Turn the screw counterclockwise.
  - If there is a clearance at the lower part of the CTL Head:  
...Turn the screw clockwise.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the clearance between the CTL Head and Tension Regulator Slantness Check Tool meets specifications 1 and 2.  
If the specifications are not met, adjust again from step 1.

When specification 2 is not met (azimuth adjustment) :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the azimuth adjustment screw so that the required specification is met.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the clearance between the CTL Head and Tension Regulator Slantness Check Tool meets specifications 1 and 2.  
If the specifications are not met, adjust again from step 1.

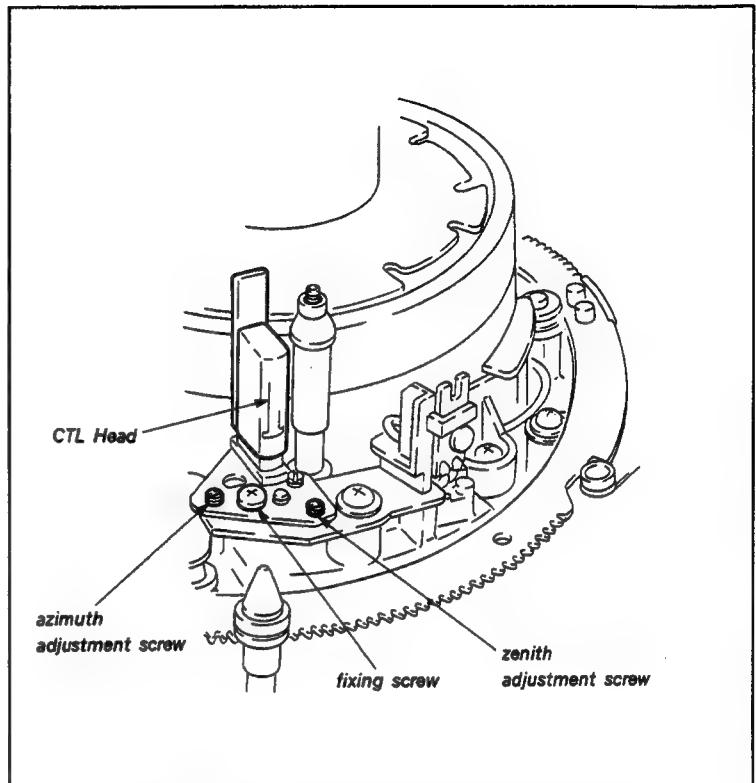


Fig. 4-5-4. CTL Head Zenith/Azimuth Adjustment

#### 4-6. ATAC HEAD BLOCK ZENITH ADJUSTMENT

- The ATAC Head Block is composed by an Audio Erase Head, Audio RP Head, Time Code (TC) Head and Audio Confidence Head.

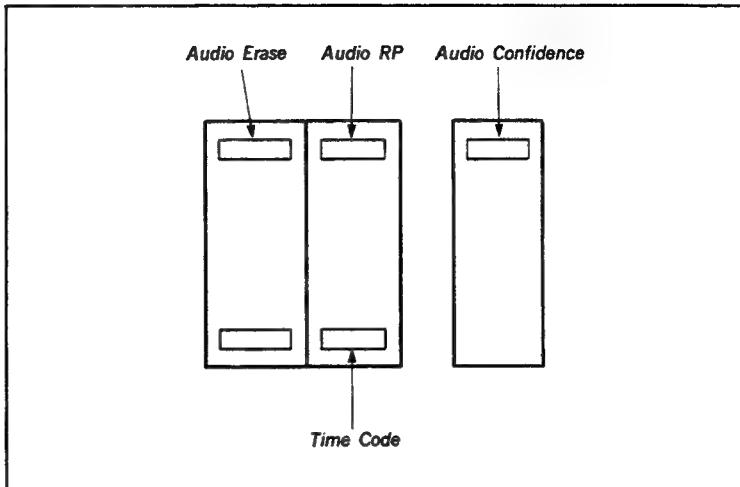


Fig. 4-6-1. Composition of ATAC Head Block

##### 4-6-1. ATAC Head Block Zenith Check

###### Fixture :

Flatness plate  
Thickness gauge

###### Check procedure :

- Put the unit into the unthreading end mode.  
(Refer to Sec.3-1.)

- Press the Flatness Plate lightly against the Exit Guide and Audio Erase Head.

**Note 1:** Press the Flatness Plate against them with the Exit Guide as reference.

**Caution 1:** Be careful not to damage the surface of Audio Erase Head and Exit Guide.

- Check that the clearance between the Audio Erase Head and Flatness Plate meets the required specification.

If the specification is not met, adjust the zenith of the Audio Erase Head in accordance with Section 4-6-2.

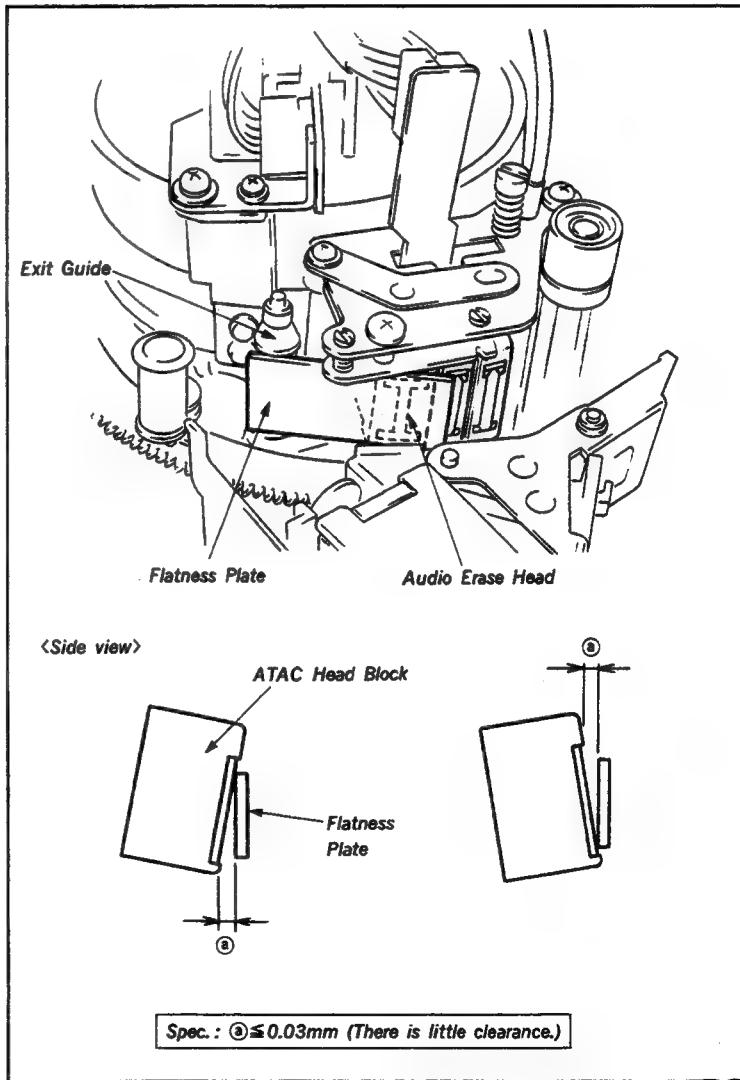


Fig. 4-6-2. ATAC Head Block Zenith Check

#### 4-6-2. ATAC Head Block Zenith Adjustment

##### Fixture :

Flatness plate  
Thickness gauge

##### When there is a clearance at the lower part of the Audio Erase Head :

1. Loosen the fixing screw by 1/4 to one turn.
2. Turn the zenith height adjustment screw clockwise so that the required specification is met.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the clearance between the Audio Erase Head and Flatness Plate meets the required specification.

If the specification is not met, adjust again from step 1.

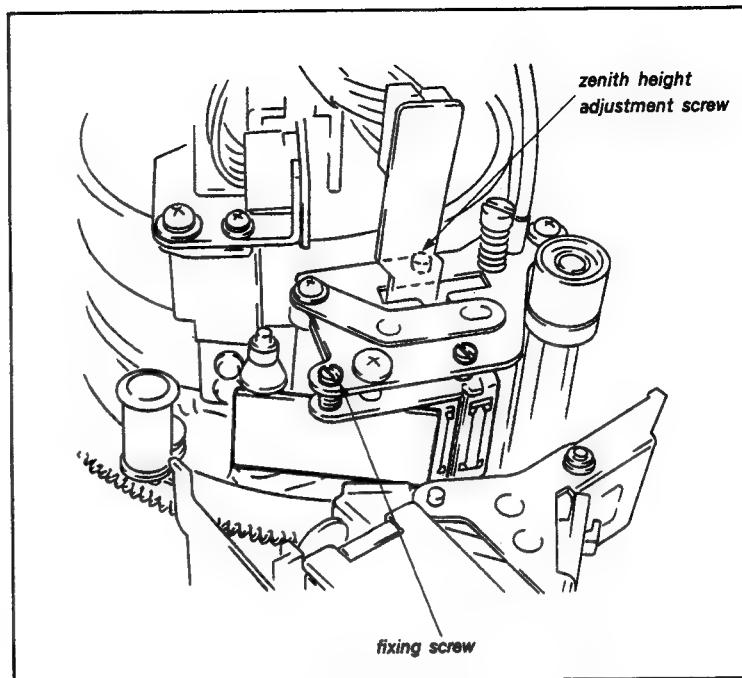


Fig. 4-6-3. ATAC Head Block Zenith Adjustment

##### When there is a clearance at the upper part of the Audio Erase Head :

1. Loosen the fixing screw by 1/4 to one turn.
2. Turn the zenith height adjustment screw counterclockwise so that the required specification is met.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the clearance between the Audio Erase Head and Flatness Plate meets the required specification.

If the specification is not met, adjust again from step 1.

#### 4-7. TRACKING ADJUSTMENT

##### Height adjustment procedure of the tape guide :

- (1) Put the flatblade of the tape guide adjustment driver in the (-)slot of the upper flange.
- (2) Loosen a locking screw one to three turns.
- (3) Turn the adjustment driver and adjust the height of the tape guide.
- (4) After adjustment is completed, tighten the locking screw.

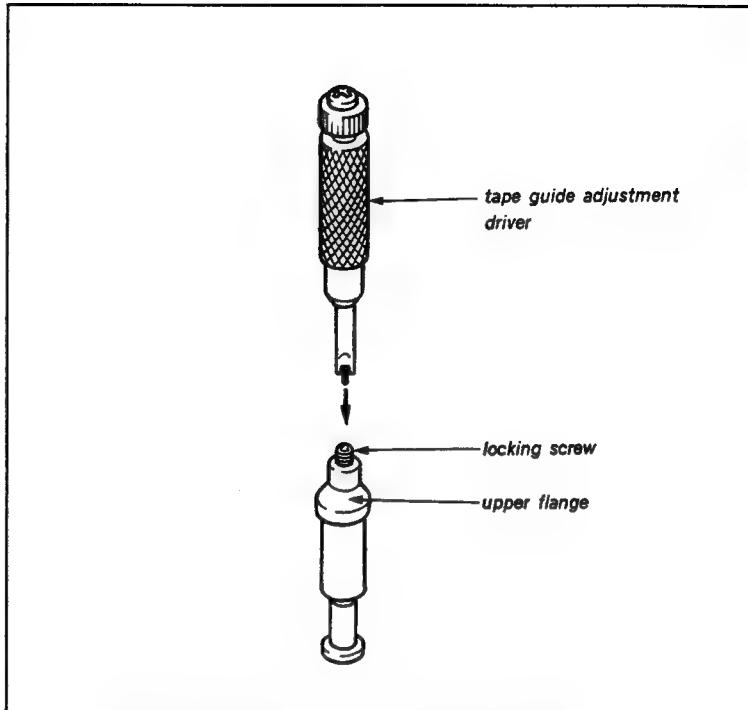


Fig. 4-7-1. Tape Guide Height Adjustment

#### 4-7-1. Tracking Check

##### Fixture :

Alignment tape without lid, CR2-1B PS (For how to make it, refer to Sec.3-1.)

Oscilloscope  
Small mirror

##### Preparation :

1. Turn the power off.
2. Disconnect CN8 on VRP-1P Board, then connect it to CN601.
3. Disconnect CN948 on MB-335 Board.
4. Short between 5 pin of CN603 on VRP-1P Board and GND with a shorting clip.
5. Connect the oscilloscope as follows ;  
CH-1 : TP602/VRP-1P Board  
TRIG : TP610/VRP-1P Board

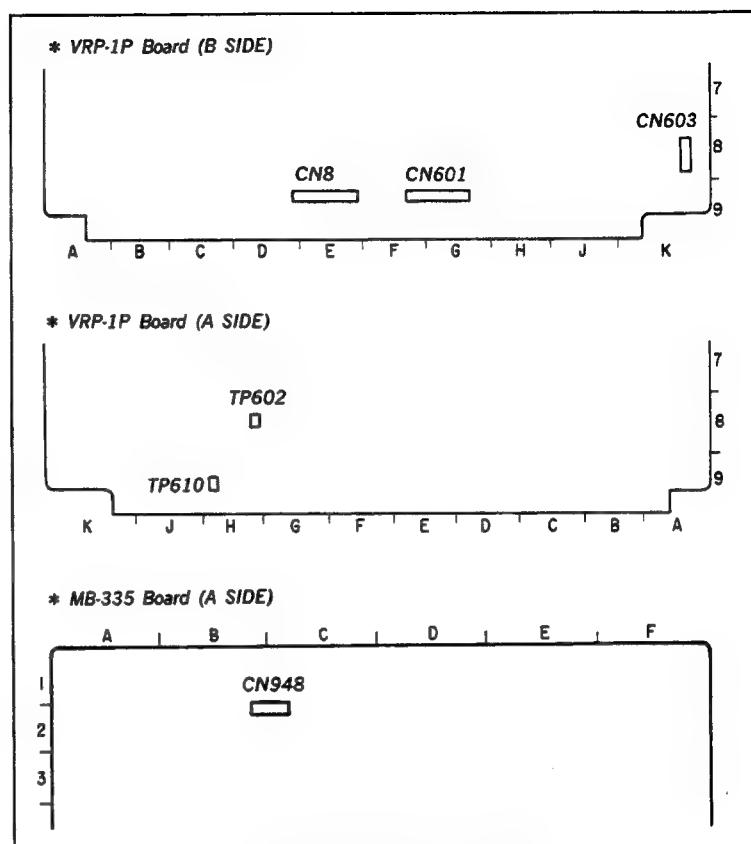


Fig. 4-7-2. Preparation

**Check procedure :**

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette tape.
3. Turn the power on.
4. Playback the alignment tape.
5. When turning the TRACKING control on the left side of the unit, check that the RF waveform maintains a flat envelope while the amplitude increases and decreases.
6. Turn the TRACKING control so that the amplitude of the RF waveform is maximum. Check that the head-to-tape contact and fluctuation of the RF waveform meet the required specification.  
If the specification is not met, perform the tracking adjustment in accordance with Section 4-7-2.

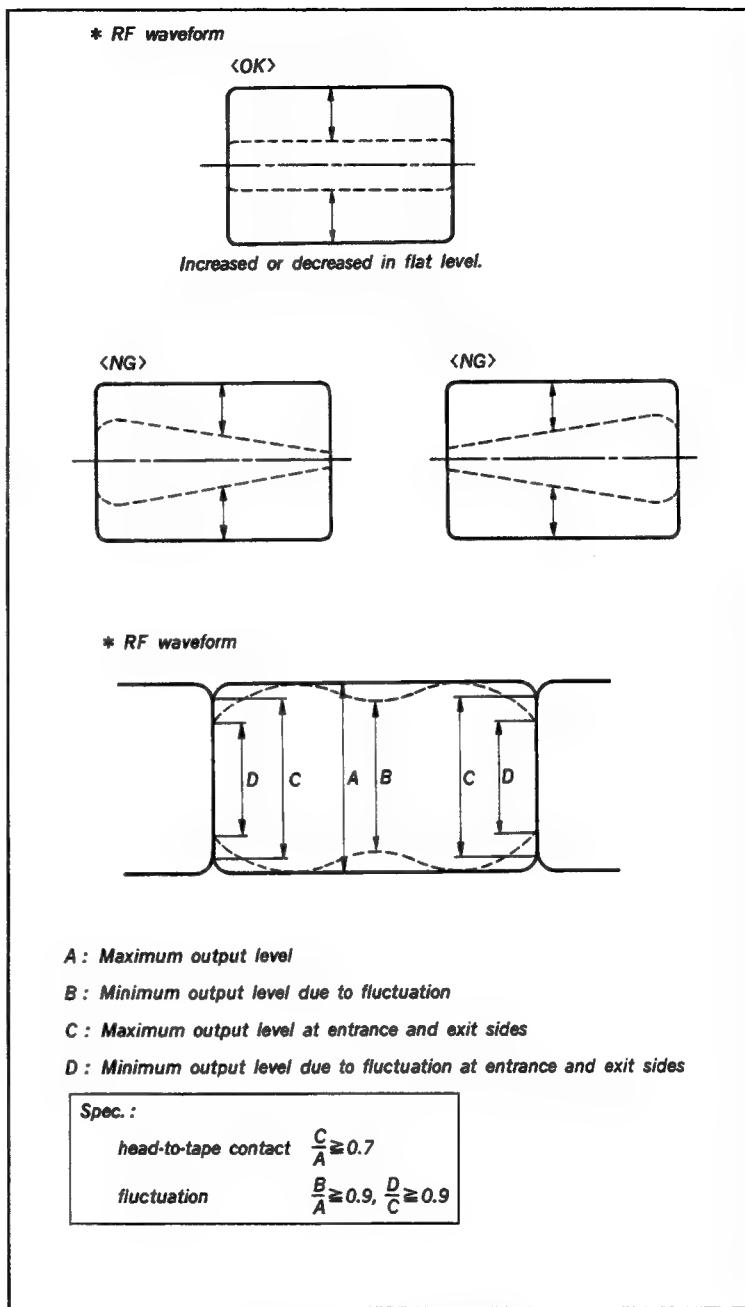


Fig. 4-7-3. Tracking Check

#### 4-7-2. Tracking Adjustment

##### Fixture :

Alignment tape without lid, CR2-1B PS (For how to make it, refer to Sec.3-1.)  
Oscilloscope  
Small mirror  
Tape guide adjustment driver

##### Tracking adjustment at drum entrance side :

1. Turn the TRACKING control so that the RF envelope amplitude is 70 to 80% of the maximum level.
2. Loosen the locking screws of the Entrance Guide and TG-3 by one to three turns. Turn the upper flanges with the tape guide adjustment driver and adjust the height so that the tape does not touch them. Check that the RF waveform is as shown in Fig.1.

If the RF waveform is not as shown in the figure, check the slant of the Tension Regulator Roller in accordance with Section 4-3-1.

3. Perform the following adjustments so that the waveform is flat at the entrance side of the RF waveform. (Refer to Fig.2.)
  - (1) Adjust the height of the upper flange of TG-3 so that the tape runs in contact with the upper flange without any tape curl.
  - (2) Adjust the height of upper flange of the Entrance Guide so that the tape runs in contact with the upper flange and the tape runs along the lead of the Drum.

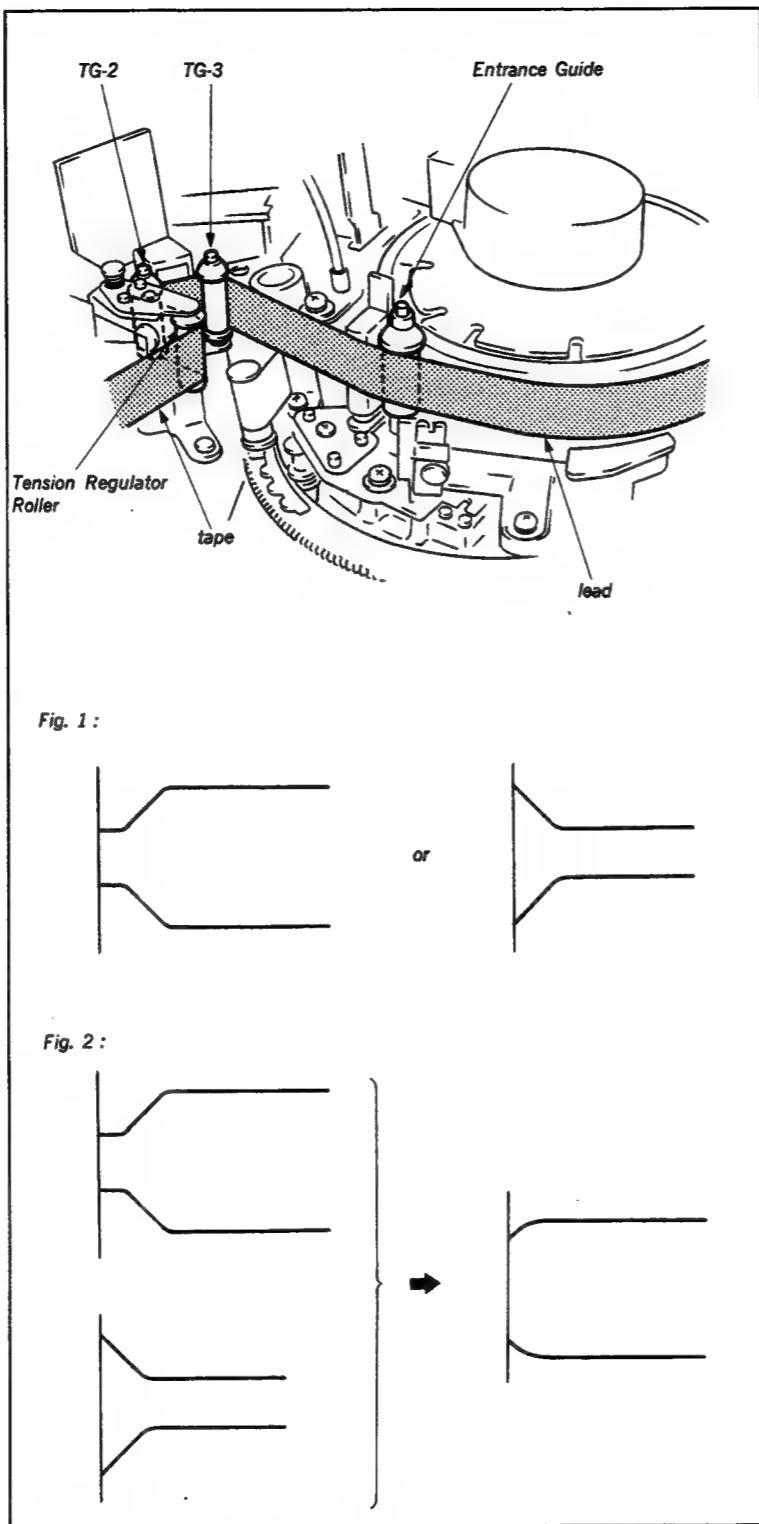


Fig. 4-7-4. Tracking Adjustment at Drum Entrance Side

##### Tracking adjustment at drum exit side :

4. Turn the TRACKING control so that the RF envelope amplitude is 70 to 80% of the maximum level.
5. Loosen the locking screw of the Exit Guide by one to three turns. Turn the upper flange with the tape guide adjustment driver and adjust the height so that the tape does not touch it. Check that the RF waveform is as shown in Fig.3.
6. Perform the following adjustment so that the waveform is flat at the exit side of the RF waveform. (Refer to Fig.4.)
  - (1) Adjust the height of upper flange of the Exit Guide so that the tape runs in contact with the upper flange and the tape runs along the lead of the Drum.
7. Perform the tape running check in accordance with Section 4-7-3.

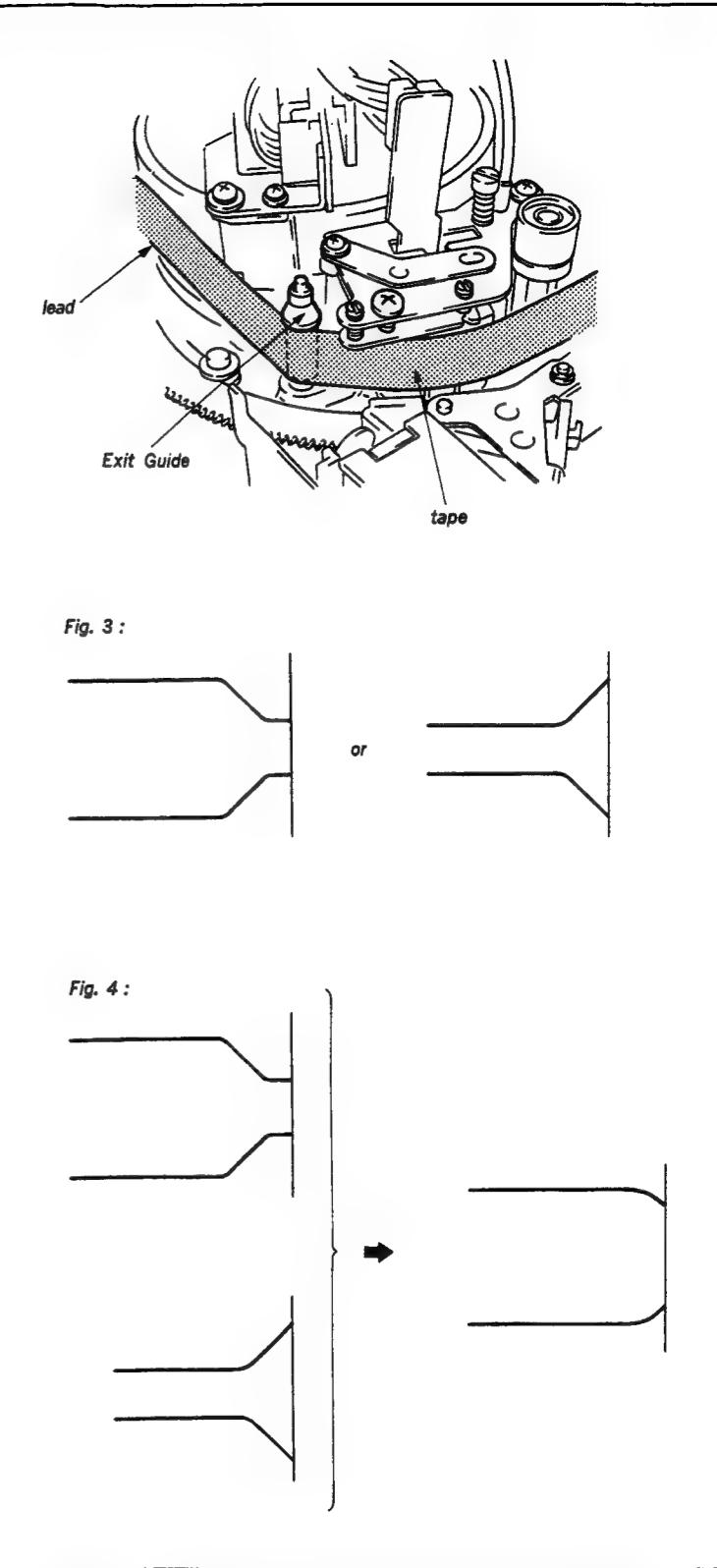


Fig. 4-7-5. Tracking Adjustment at Drum Exit Side

#### 4-7-3. Tape Running Check

##### Fixture:

Cassette tape without lid (For how to make it, refer to Sec. 3-1.)  
Small mirror

##### Check procedure:

1. Insert a cassette tape, and put a weight not to rise up the cassette tape.  
**Note:** Never use an alignment tape.
2. Check the tape running condition in the following modes.
  - (1) PLAY mode
  - (2) FF SEARCH mode
  - (3) REW SEARCH mode
  - (4) F FWD mode
  - (5) REW mode
3. If the required specifications are not met, perform the tracking adjustment in accordance with Section 4-7-2.

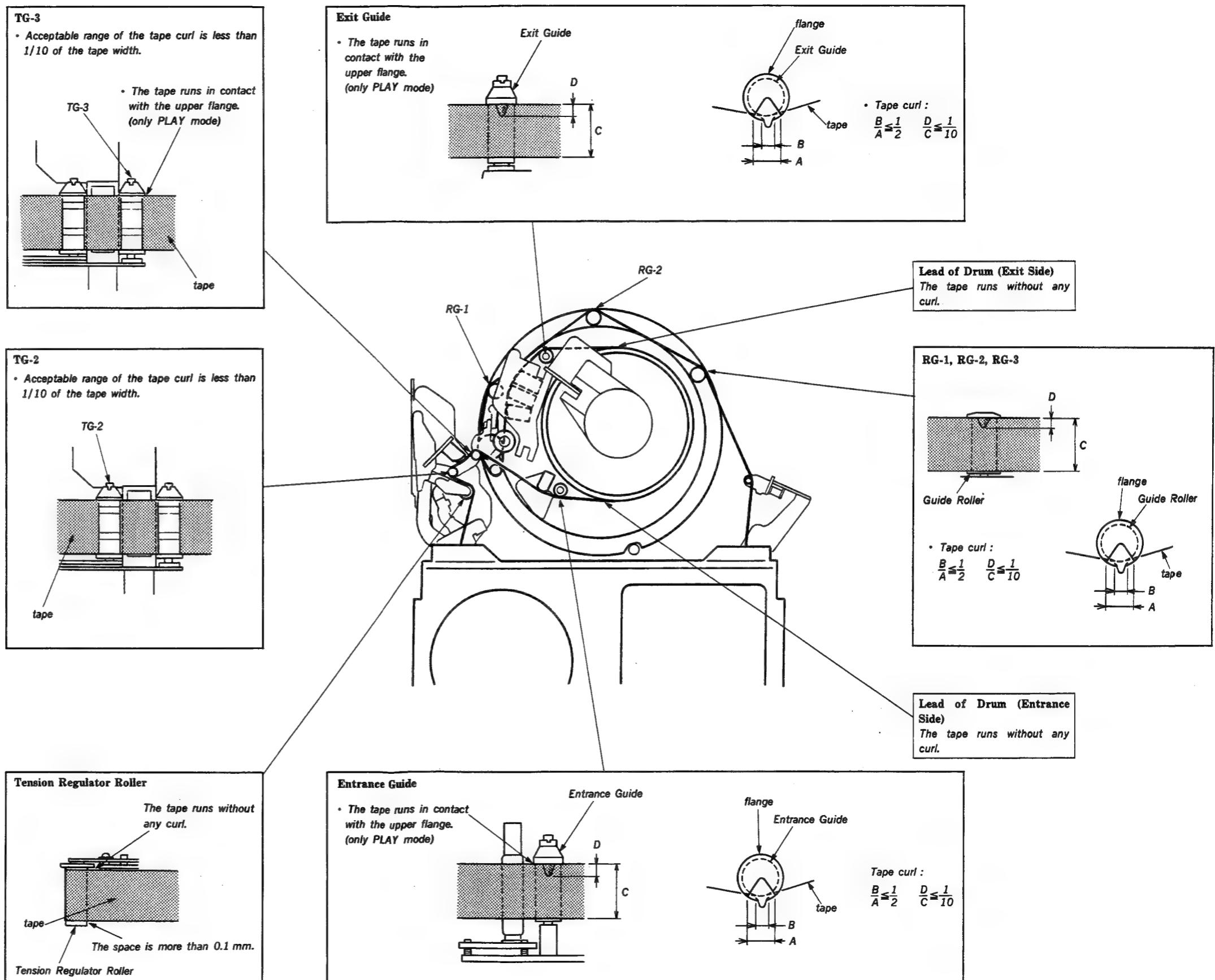


Fig. 4-7-6. Tape Running Check

## 4-8. CTL HEAD HEIGHT ADJUSTMENT

### 4-8-1. CTL Head Height Check

#### Fixture :

Alignment tape without lid, CR8-1A PS (For how to make it, refer to Sec.3-1.)

Oscilloscope

Tooth pick (or equivalent)

#### Preparation :

1. Turn the power off.
2. Connect the oscilloscope as follows ;  
CH-1 : CN8-2 pin/SST-1P Board

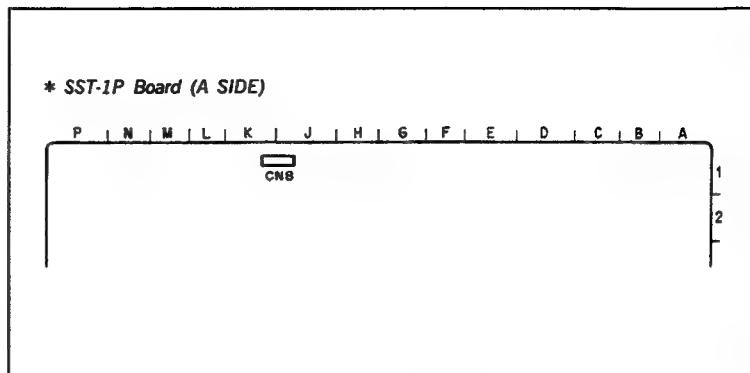


Fig. 4-8-1. Preparation

#### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette.
3. Turn the power on.
4. Playback the audio 1 kHz signal portion recorded on the CTL track on the alignment tape.
5. Check that the level decreases when pressing down the tape at A portion shown in the figure with a tooth pick. Similarly, check that the level decreases when pushing up the tape at B portion.  
If the level increase, adjust the height of the CTL Head in accordance with Section 4-8-2.

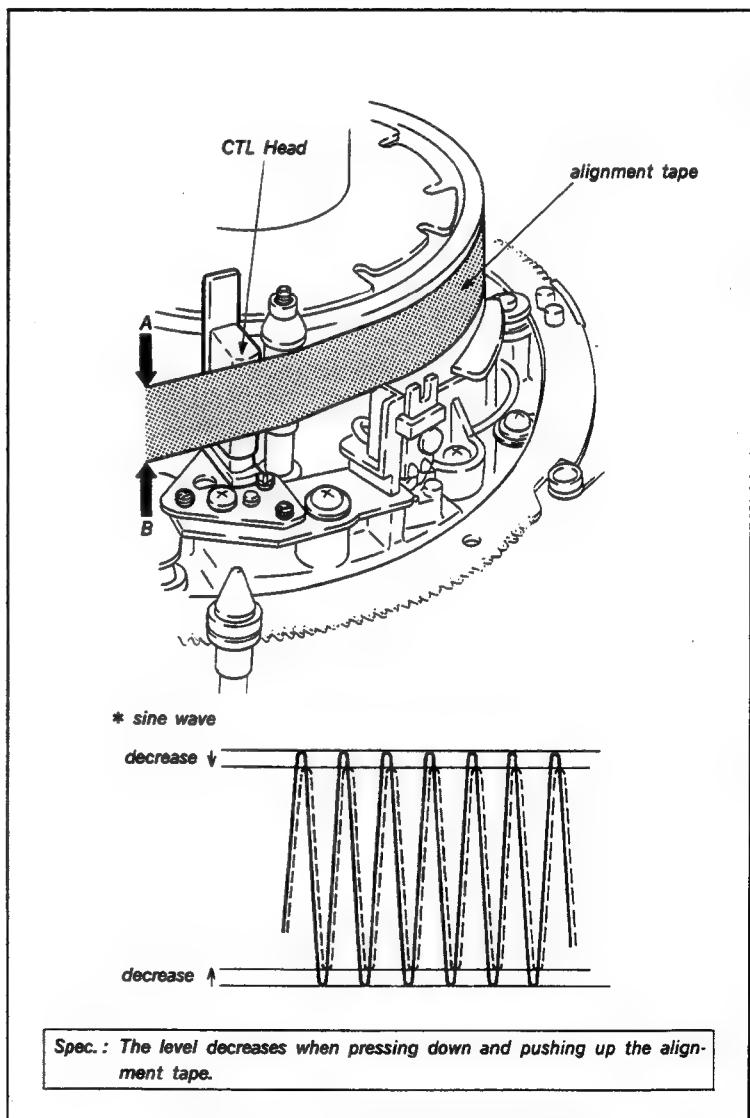


Fig. 4-8-2. CTL Head Height Check

#### 4-8-2. CTL Head Height Adjustment

##### Fixture :

Alignment tape without lid, CR8-1A PS (For how to make it, refer to Sec.3-1.)

Oscilloscope

Tooth pick (or equivalent)

##### When the level increase while pressing down the tape :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the height adjustment screw, azimuth adjustment screw and zenith adjustment screw an exactly equal amount in the clockwise direction so that the maximum level is obtained.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the required specification is met.  
If the specification is not met, adjust again from step 1.

##### When the level increase while pushing up the tape :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the height adjustment screw, azimuth adjustment screw and zenith adjustment screw an exactly equal amount in the counterclockwise direction so that the maximum level is obtained.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the required specification is met.  
If the specification is not met, adjust again from step 1.

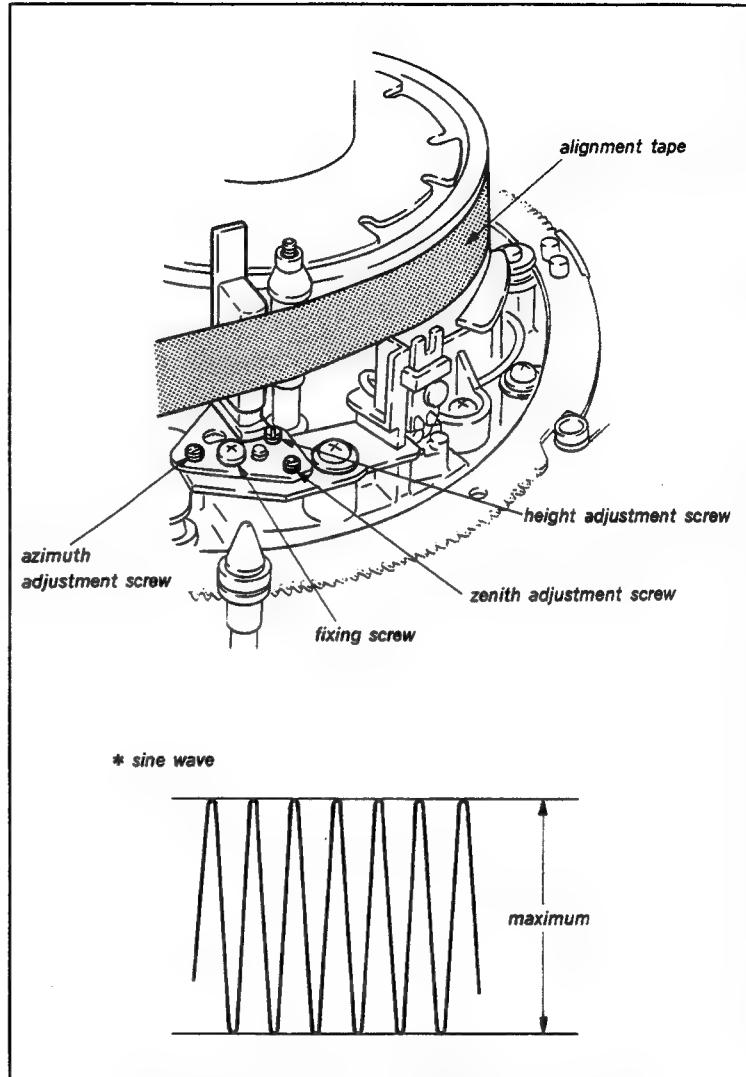


Fig. 4-8-3. CTL Head Height Adjustment

## 4-9. CTL HEAD POSITION ADJUSTMENT

### 4-9-1. CTL Head Position Check

#### Fixture :

Alignment tape without lid, CR2-1B PS (For how to make it, refer to Sec.3-1.)  
Oscilloscope

#### Preparation :

1. Turn the power off.
2. Disconnect CN8 on VRP-1P Board, then connect it to CN601.
3. Disconnect CN948 on MB-335 Board.
4. Short between 5 pin of CN603 on VRP-1P Board and GND with a shorting clip.
5. Connect the oscilloscope as follows ;
  - CH-1 : TP602/VRP-1P Board
  - CH-2 : TP610/VRP-1P Board
  - TRIG : TP610/VRP-1P Board

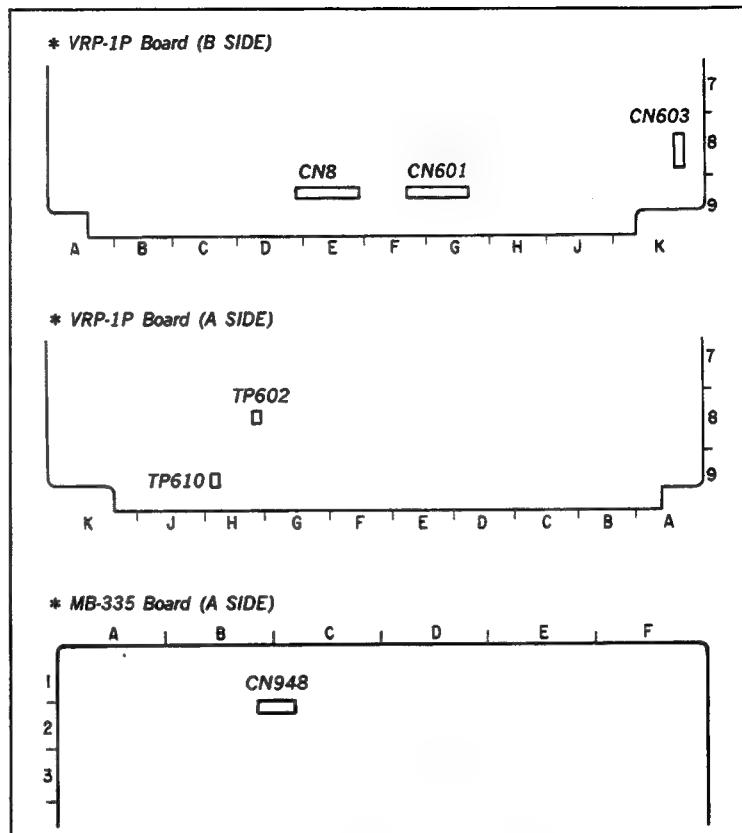


Fig. 4-9-1. Preparation

#### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette.
3. Turn the power on.
4. Playback the alignment tape.
5. Turn the TRACKING control on the left side of the unit and set it to the center click position.
6. Check that the RF waveform meets the required specification.  
If the specification is not met, adjust the position of the CTL Head in accordance with Section 4-9-2.

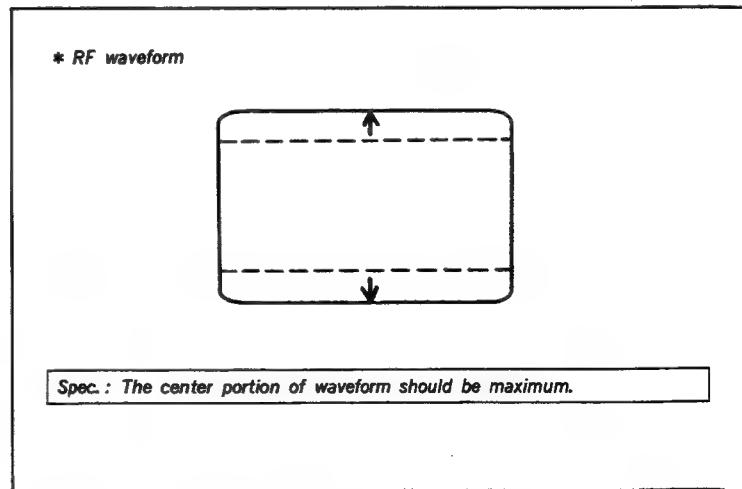


Fig. 4-9-2. CTL Head Position Check

#### 4-9-2. CTL Head Position Adjustment

##### Fixture :

Alignment tape without lid, CR2-1B PS (For how to make it, refer to Sec. 3-1.)

Oscilloscope

##### Adjustment procedure :

1. Loosen the fixing screw by one to two turns.
2. Insert a flatblade screwdriver (3 mm dia.) into the notch of the CTL Head Base and adjust the position of the CTL Head so that the RF envelope waveform is maximum.
3. Tighten the fixing screw.
4. After tightening the fixing screw, turn the TRACKING control and check that the required specification is met in the center click position.  
If the specification is not met, adjust again from step 1.

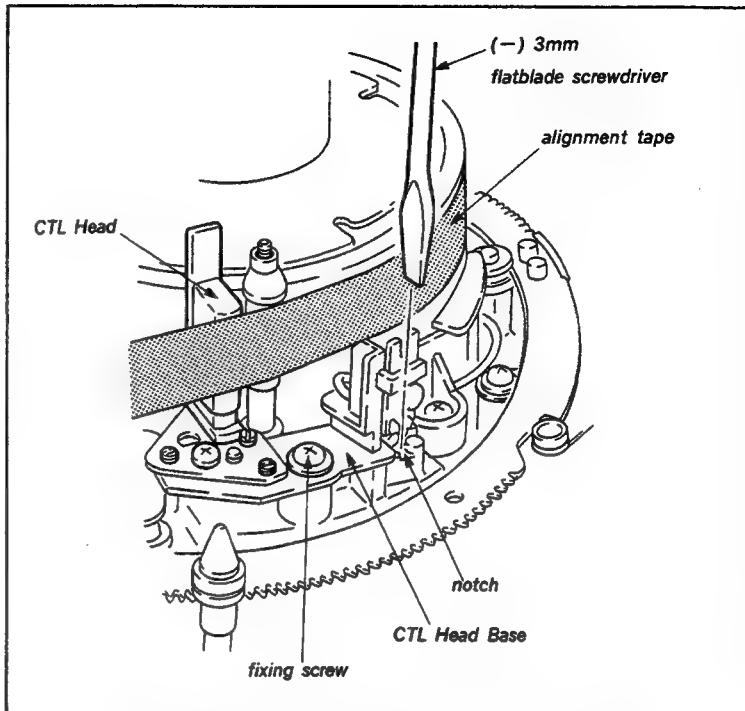


Fig. 4-9-3. CTL Head Position Adjustment

## 4-10. AUDIO HEAD HEIGHT ADJUSTMENT

### 4-10-1. Audio Head Height Check

#### Fixture :

Alignment tape, CR8-1A PS

Oscilloscope

Tooth pick (or equivalent)

#### Preparation :

1. Turn the power off.
2. Connect the oscilloscope as follows ;  
CH-1: AUDIO OUT CH-1/Connector Panel  
CH-2: AUDIO OUT CH-2/Connector Panel

#### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette.
3. Turn the power on.
4. Playback the audio 1 kHz signal portion on the alignment tape.
5. Check that the level decreases when pressing down the tape at A portion shown in the figure with a tooth pick. Similarly, check that the level decreases when pushing up the tape at B portion.  
If the level increase, adjust the height of Audio Head in accordance with Section 4-10-2.

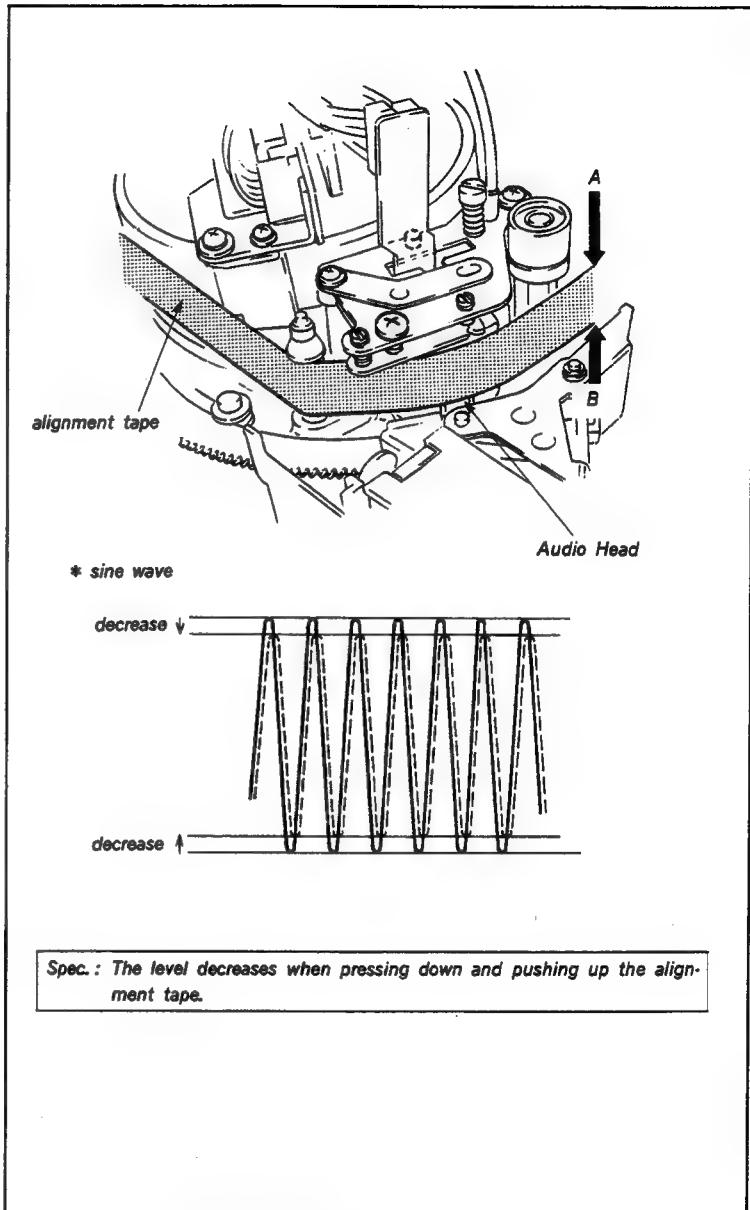


Fig. 4-10-1. Audio Head Height Check

#### 4-10-2. Audio Head Height Adjustment

##### Fixture:

Alignment tape, CR8-1A PS

Oscilloscope

Tooth pick (or equivalent)

##### When the level increase while pressing down the tape :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the height adjustment screw, azimuth adjustment screw and zenith height adjustment screw an exactly equal amount so that the maximum level is obtained.
  - Height adjustment screw and zenith height adjustment screw  
... Turn counterclockwise.
  - Azimuth adjustment screw  
... Turn clockwise.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the required specification is met.  
If the specification is not met, adjust again from step 1.

##### When the level increase while pushing up the tape :

1. Loosen the fixing screw by 1/2 to one turn.
2. Turn the height adjustment screw, azimuth adjustment screw and zenith height adjustment screw an exactly equal amount so that the maximum level is obtained.
  - Height adjustment screw and zenith height adjustment screw  
... Turn clockwise.
  - Azimuth adjustment screw  
... Turn counterclockwise.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the required specification is met.  
If the specification is not met, adjust again from step 1.

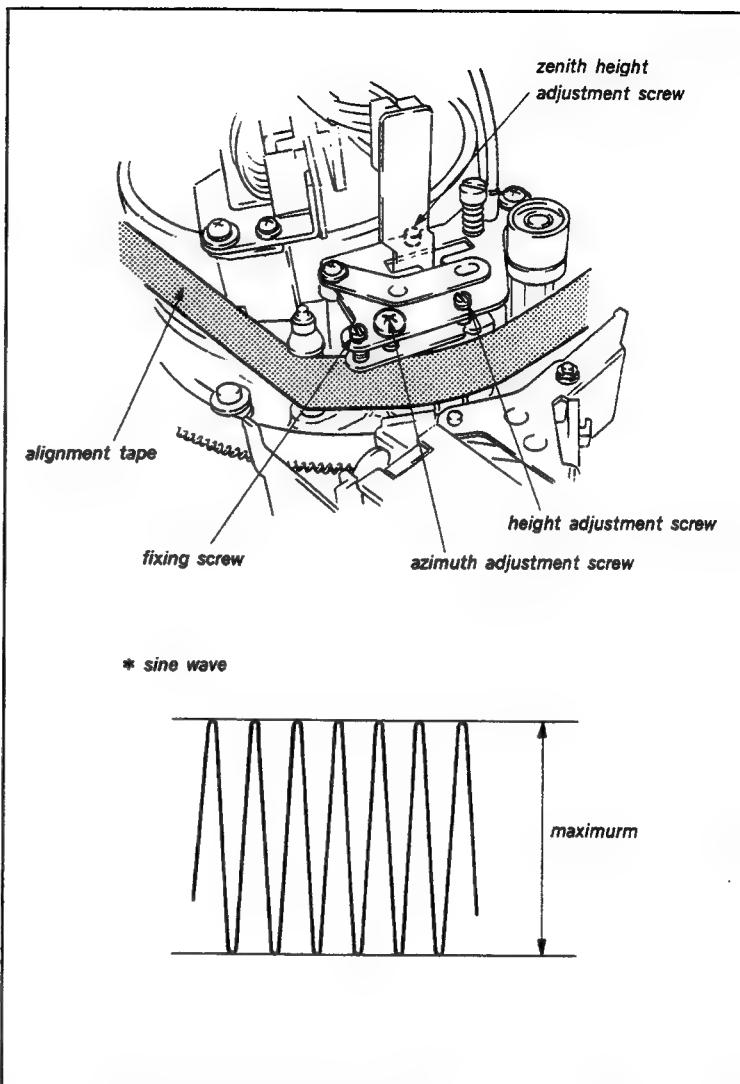


Fig. 4-10-2. Audio Head Height Adjustment

## 4-11. AUDIO HEAD PHASE ADJUSTMENT

### 4-11-1. Audio Head Phase Check

#### Fixture :

Alignment tape, CR8-1A PS  
Oscilloscope

#### Preparation :

1. Turn the power off.
2. Connect the oscilloscope as follows ;  
HORIZONTAL terminal :  
AUDIO OUT CH-1/Connector Panel  
VERTICAL terminal :  
AUDIO OUT CH-2/Connector Panel

#### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette.
3. Turn the power on.
4. Playback the audio 10 kHz signal portion on the alignment tape.
5. Adjust the oscilloscope for horizontal and vertical amplitudes to 6 cm of a lissajous waveform.
6. Check that the phase difference meets the required specification 1.
7. Playback the audio 1 kHz signal portion on the alignment tape. Check that the phase difference meets the required specification 2.
8. If the specifications 1 and 2 are not met, adjust the phase of the Audio Head in accordance with Section 4-11-2.

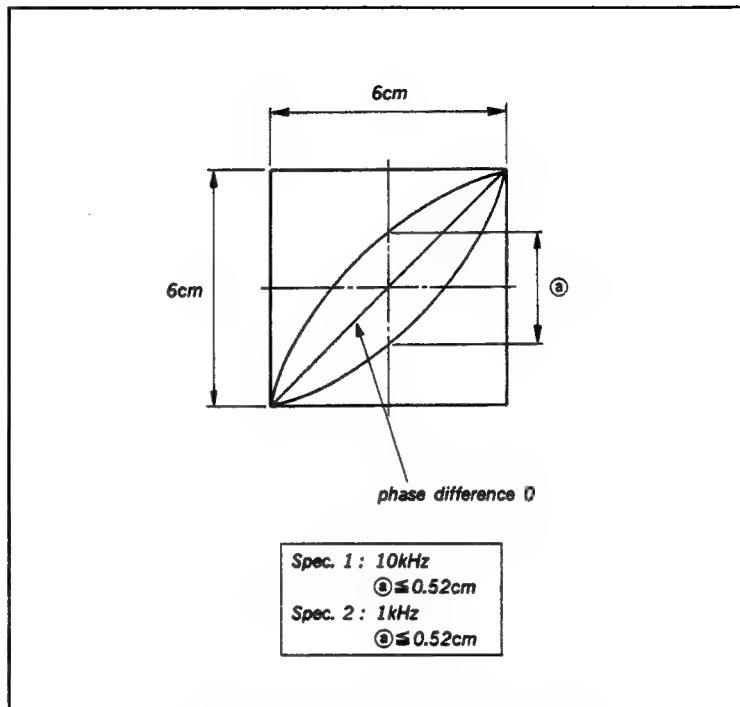


Fig. 4-11-1. Audio Head Phase Check

#### 4-11-2. Audio Head Phase Adjustment

##### Fixture:

Alignment tape, CR8-1A PS  
Oscilloscope

##### Adjustment procedure:

1. Loosen the fixing screw by 1/4 to 1/2 turn.
2. Adjust the phase by turning the azimuth adjustment screw so that the required specifications 1 and 2 are met.
3. Tighten the fixing screw.
4. After tightening the fixing screw, check that the phase difference meets the required specifications.
5. Tap the AT Head Bracket with the tip of a screwdriver, and check that the phase is not shifted.  
If the phase is shifted, adjust again from step 1.

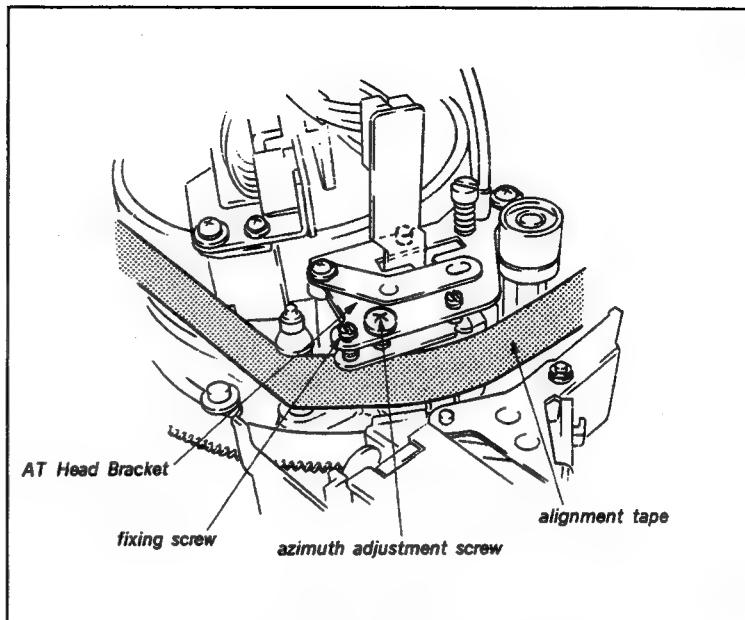


Fig. 4-11-2. Audio Head Phase Adjustment

## 4.12. TC HEAD POSITION ADJUSTMENT

- It is required that the CTL Head position adjustment (Sec.4-9) is correct before initiating this adjustment.

### 4.12-1. TC Head Position Check

#### Fixture :

Alignment tape, CR2-1B PS  
Oscilloscope

#### Preparation :

1. Turn the power off.
2. Connect the oscilloscope as follows ;  
CH-1 : CN8-1 pin/SST-1P Board  
CH-2 : TC OUT/Connector Panel

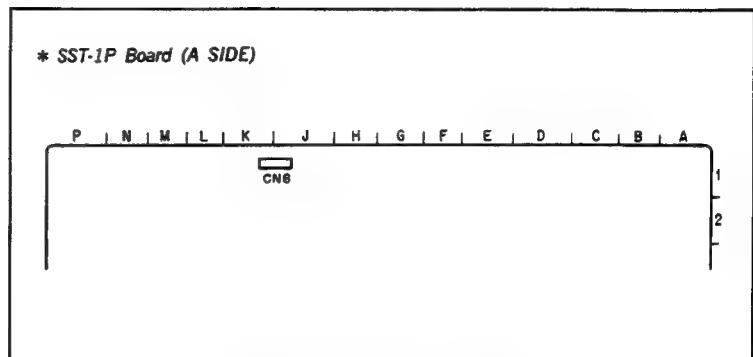


Fig. 4-12-1. Preparation

#### Check procedure :

1. Put both S and T Reel Table Assemblies into the S cassette position.  
(Refer to Sec.3-1.)
2. Insert an alignment tape without lid, and put a weight not to rise up the cassette.
3. Turn the power on.
4. Playback the alignment tape.
5. Check that the waveforms meet the required specification.  
If the specification is not met, adjust the position of the TC Head in accordance with Section 4-12-2.

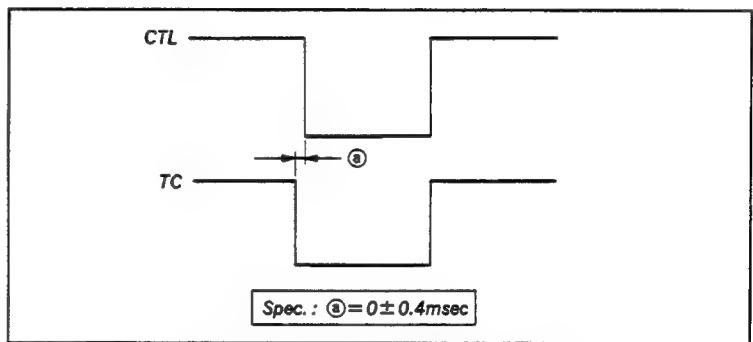


Fig. 4-12-2. TC Head Phase Check

#### 4-12-2. TC Head Position Adjustment

##### Fixture :

Alignment tape, CR2-1B PS

Oscilloscope

Eccentricity driver (4 mm dia.)

##### Adjustment procedure :

1. Loosen two TC Head fixing screws by one to two turns.
2. Insert the eccentricity driver into the hole of the Y Adjuster, and adjust the position of the TC Head so that the required specification is met.
3. Tighten two TC Head fixing screws.
4. After tightening the fixing screws, check that the required specification is met.  
If the specification is not met, adjust again from step 1.

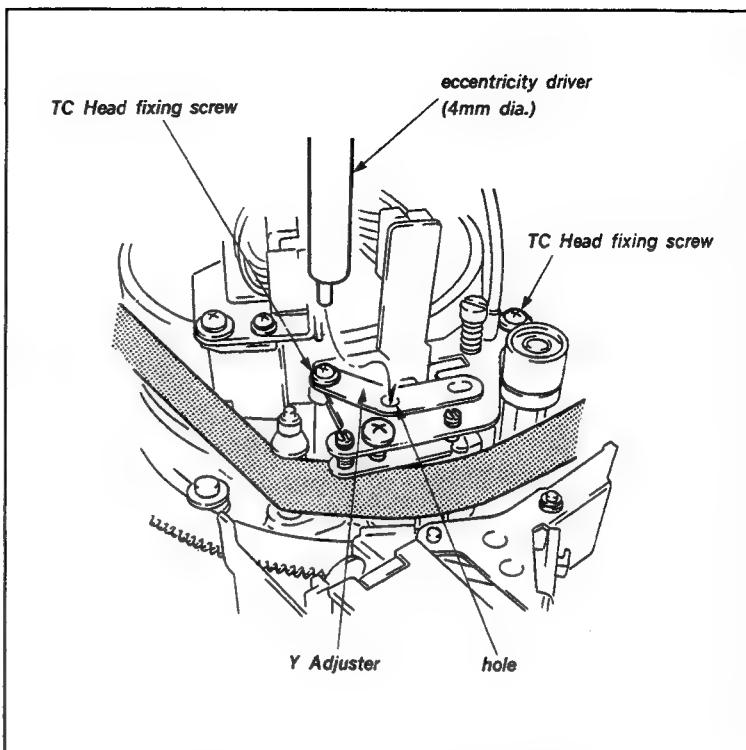


Fig. 4-12-3. TC Head Phase Adjustment

#### 4-13. CTL DELAY ADJUSTMENT

##### Fixture :

Alignment tape, CR2-1B PS  
Oscilloscope

##### Preparation :

1. Put the unit into the stand-by off stop mode.
2. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release to enter SERVO ADJ. mode.
3. Press and release S501 on SST-1P Board 14 times to set the ADDRESS to "14".
4. Connect the oscilloscope as follows;  
 CH-1: TP610/VRP-1P Board  
 CH-2: TP602/VRP-1P Board  
 TRIG: TP610/VRP-1P Board
5. Connect a video monitor to the VIDEO OUT 2 connector.
6. Supply the video signal to the VIDEO IN connector.

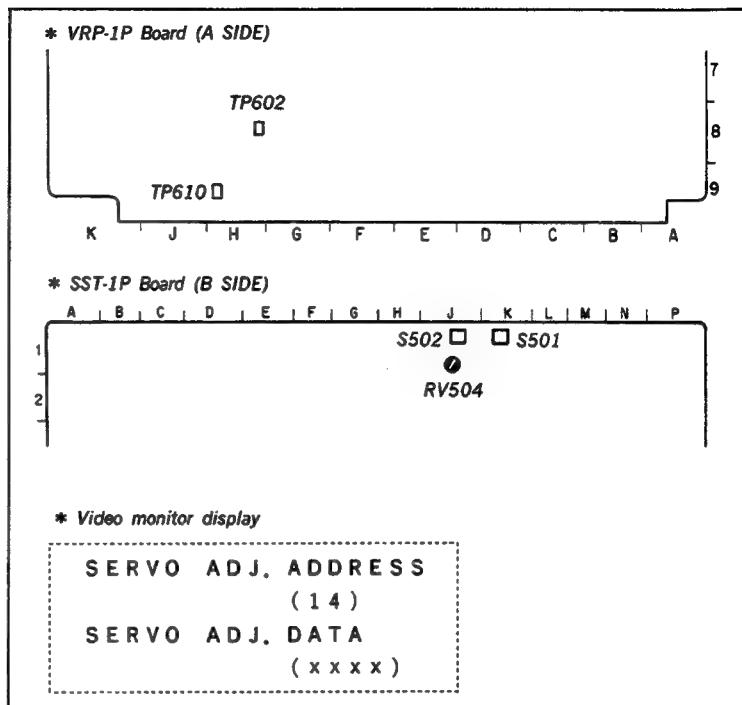


Fig. 4-13-1. Preparation

##### Check procedure :

1. Playback the alignment tape.
2. Adjust RV504 on SST-1P Board so that the RF envelope waveform meets the required specification.
3. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 1 second alternately.
4. Press S502 on SST-1P Board for approx. 1 second and release.
5. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 0.5 second alternately.

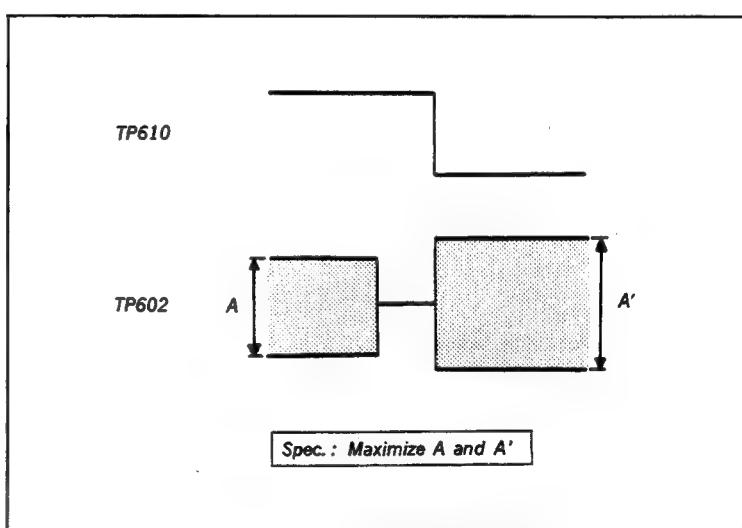


Fig. 4-13-2. CTL Delay Adjustment

6. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release.  
Check that the "SERVO ADJ." display disappears.

## 4-14. SWITCHING POSITION ADJUSTMENT

### 4-14-1. REC Head Switching Position Adjustment

**Fixture :**

Alignment tape, CR2-1B PS  
Oscilloscope

**Preparation :**

1. Disconnect CN8 on VRP-1P Board, then connect it to CN601 on VRP-1P Board.
2. Short between 5 pin of CN603 on VRP-1P Board and GND with a shorting clip.
3. Put the unit into the stand-by off stop mode.
4. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release to enter SERVO ADJ. mode.
5. Press and release S501 on SST-1P Board 12 times to set the ADDRESS to "12".
6. Connect the oscilloscope as follows;  
 CH-1: TP610/VRP-1P Board  
 CH-2: TP602/VRP-1P Board  
 TRIG: TP610/VRP-1P Board
7. Connect a video monitor to the VIDEO OUT 2 connector.
8. Supply the video signal to the VIDEO IN connector.

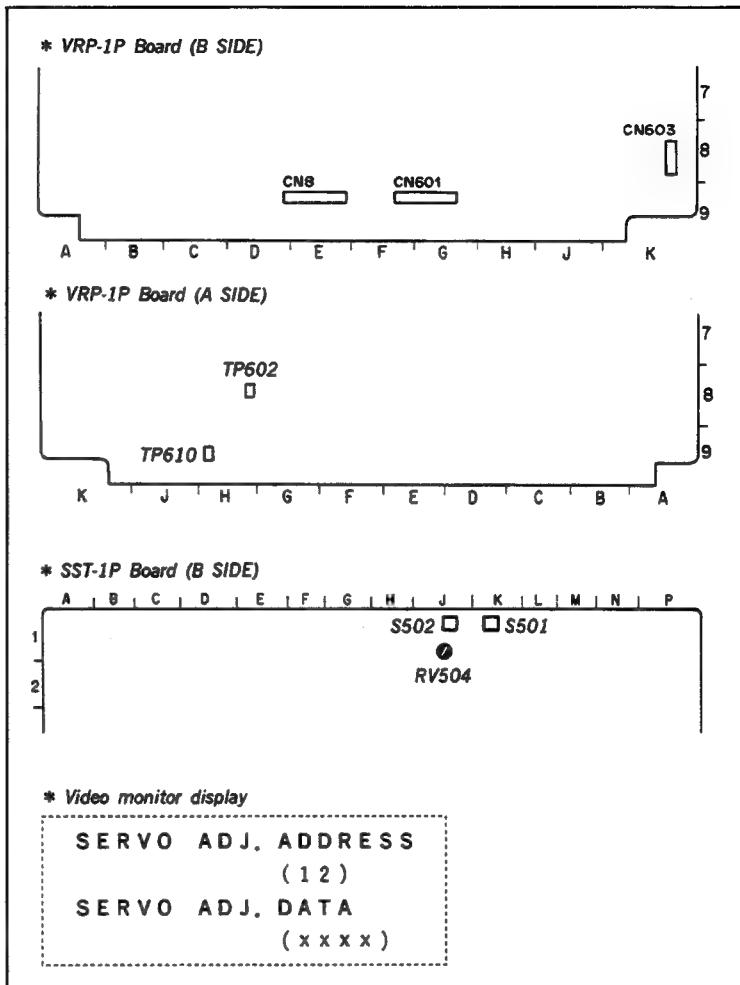


Fig. 4-14-1. Preparation

**Check procedure :**

1. Playback the alignment tape.
2. Adjust RV504 on SST-1P Board so that the RF envelope waveform meets the required specification.
3. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 1 second alternately.

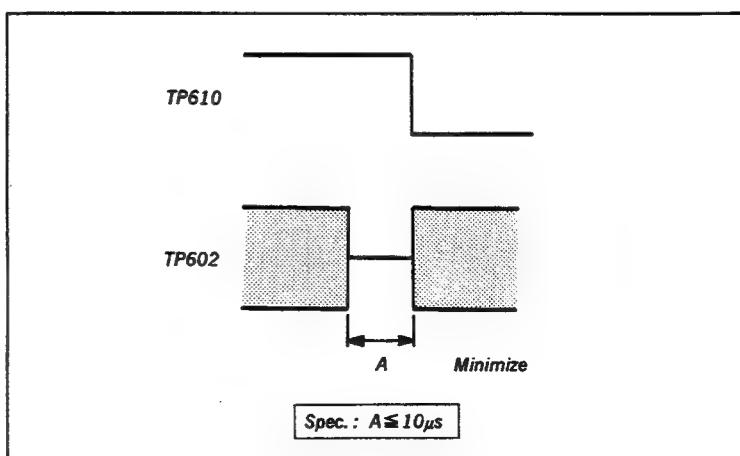


Fig. 4-14-2. Rec Head Switching Position Adjustment

4. Press S502 on SST-1P Board for approx. 1 second and release.
5. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 0.5 second alternately.
6. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release. Check that the "SERVO ADJ." display disappears.
7. Remove the shorting clip between 5 pin of CN603 on VRP-1P Board and GND.
8. Return CN8 on VRP-1P Board to the former position.

#### 4-14-2. PB Head Switching Position Adjustment

##### Fixture :

Alignment tape, CR2-1B PS  
Oscilloscope

##### Preparation :

1. Put the unit into the stand-by off stop mode.
2. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release to enter SERVO ADJ. mode.
3. Press and release S501 on SST-1P Board 13 times to set the ADDRESS to "13".
4. Connect the oscilloscope as follows ;  
 CH-1 : TP610/VRP-1P Board  
 CH-2 : TP602/VRP-1P Board  
 TRIG : TP610/VRP-1P Board
5. Connect a video monitor to the VIDEO OUT 2 connector.
6. Supply the video signal to the VIDEO IN connector.

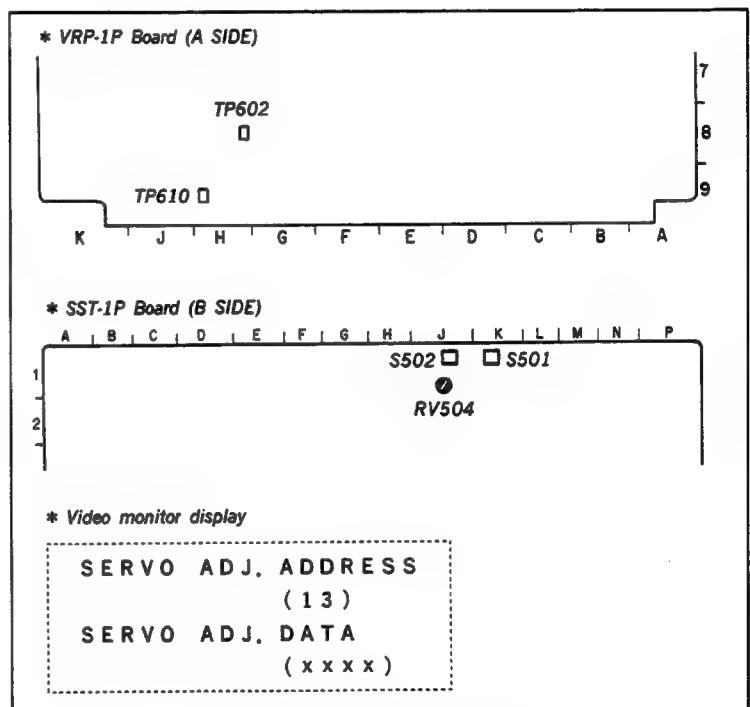
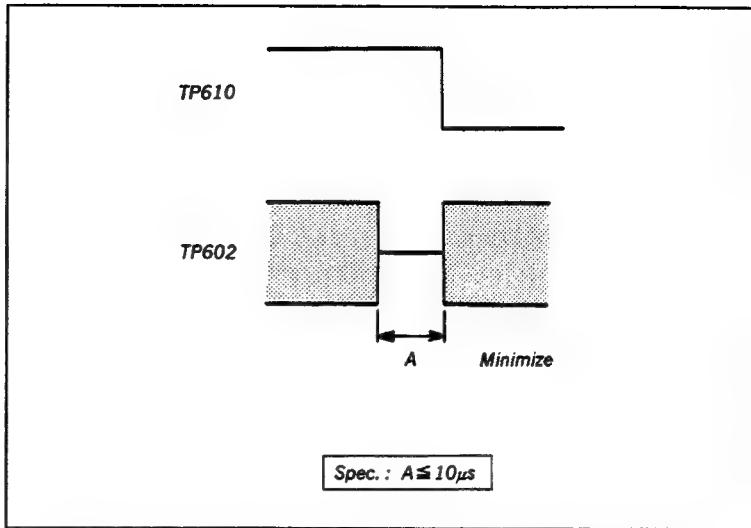


Fig. 4-14-3. Preparation

**Check procedure :**

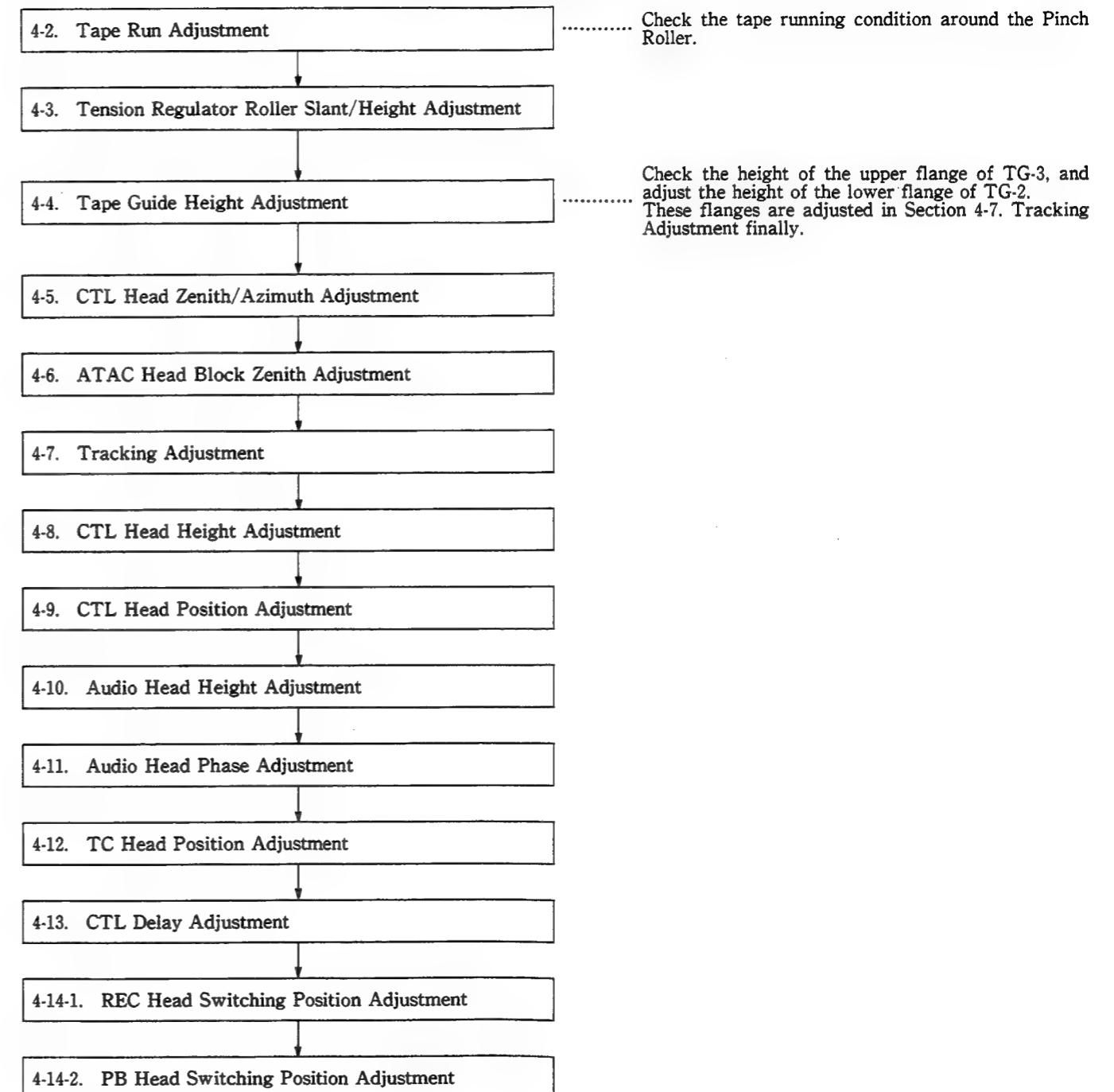
1. Playback the alignment tape.
2. Adjust RV504 on SST-1P Board so that the RF envelope waveform meets the required specification.
3. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 1 second alternately.
4. Press S502 on SST-1P Board for approx. 1 second and release.
5. Check that the final value in step 2 and "0000" are displayed in DATA field at intervals of approx. 0.5 second alternately.
6. Press S501 and S502 on SST-1P Board simultaneously for approx. 2 second and release.  
Check that the "SERVO ADJ." display disappears.



**Fig. 4-14-4. PB Head Switching Position Adjustment**

#### **ADJUSTMENT PROCEDURE:**

When the parts that affect the tape running have been replaced or when tape does not run normally, perform the checks or adjustments as the following flowchart.





## SECTION 5

### POWER SUPPLY AND SYSTEM CONTROL ALIGNMENT

#### **[Equipment Required]**

- DC digital voltmeter
- PAL test signal generator (TEKTRONIX TSG-271 or equivalent)
- Frequency counter
- Blank tape (BCT-20M)

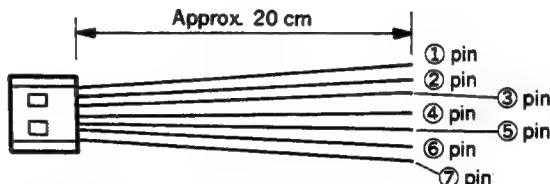
#### **5-1. POWER SUPPLY CHECK**

Be sure to perform the following checks after repairing or replacing DC-DC converter/PSW-12.

##### **5-1-1. DC-DC Converter Voltage Check**

Prepare the following cable for measurement.

HOUSING, 7P P/N 1-569-200-11 (1 pc.)  
CONTACT, FEMALE P/N 1-569-194-11 (7 pcs.)



Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Insert the prepared cable for measurement into CN971/MB-335 (on the A side facing the drum).</li> <li>• EXT DC IN; <math>12.0 \pm 5.0</math> Vdc</li> <li>• VIDEO IN; Color Bars</li> <li>• CAMERA/LINE SW; LINE</li> <li>• MODE SW; PB/EE</li> <li>• POWER SW; ON</li> <li>• Insert a BCT-20M blank tape.</li> <li>• REC mode</li> <li>• After the check/adjustment, remove the cable for measurement.</li> </ul>	CN971-① pin/MB-335 GND CN971-② pin/MB-335 $+9.0 \pm 0.2$ Vdc CN971-③ pin/MB-335 $+5.0 \pm 0.2$ Vdc CN971-④ pin/MB-335 $+5.0 \pm 0.2$ Vdc CN971-⑤ pin/MB-335 $-5.0 \pm 0.2$ Vdc CN971-⑥ pin/MB-335 $-9.0 \pm 0.2$ Vdc CN971-⑦ pin/MB-335 EXT DC IN $\pm 0.1$ Vdc CN965-① pin/MB-335 $+48.0 \pm 4.0$ Vdc	(Check) If the specification is not satisfied, adjust the following variable resistors. +9.0 Vdc: ● RV101/PSW-12 (C-1) +5.0 Vdc: ● RV102/PSW-12 (B-1) -5.0 Vdc: ● RV103/PSW-12 (B-1) -9.0 Vdc: ● RV104/PSW-12 (B-1) +48.0 Vdc: ● RV105/PSW-12 (D-1)
DC digital voltmeter		

### 5-1-2. DC-DC Converter Frequency Check

This check should be performed only when beat noise is noticeable due to the DC-DC converter frequencies.

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"><li>• EXT DC IN; <math>12.0 \pm 5.0</math> Vdc</li><li>• MODE SW; PB/EE</li><li>• POWER SW; ON</li><li>• EE Mode</li></ul> <p>Frequency counter</p>	<p>IC102-① pin/PSW-12 (C-1) (GND) IC102-⑧ pin/PSW-12 (C-1)</p> <p>There should be no beats due to a difference between the converter frequency of IC103 and IC104 (Oscillation frequencies are <math>115 \pm 0.5</math> kHz).</p>	<p>(Check) If the specification is not satisfied, adjust the following variable resistor.</p> <p>④ RV100/PSW-12 (D-1)</p>

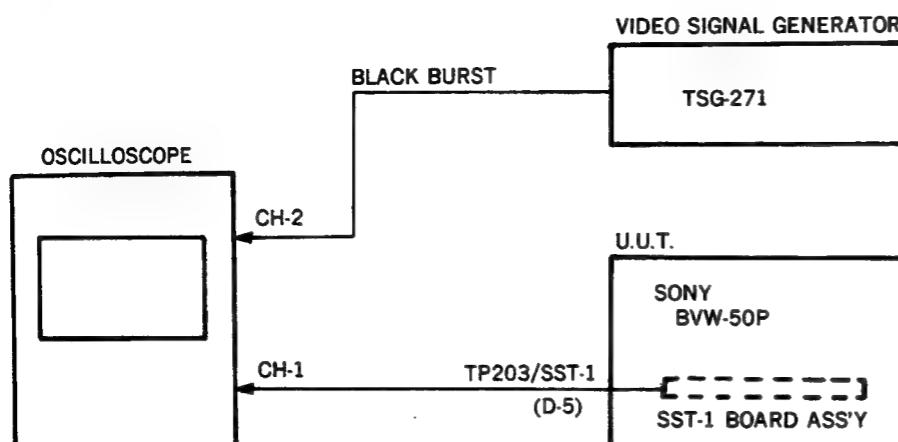
## 5-2. SYSTEM CONTROL ALIGNMENT

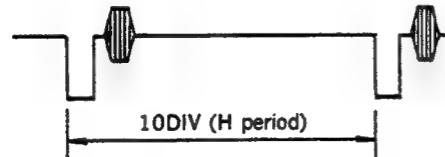
### 5-2-1. Reference Voltage Adjustment

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"><li>• EXT DC IN; <math>12.0 \pm 5.0</math> Vdc</li><li>• POWER SW; OFF</li></ul>	<p>TP5/SST-1 (D-4A) (GND) E501/SST-1 (F-5A)</p> <p><math>+5.00 \pm 0.01</math> Vdc</p>	④ RV1/SST-1 (B-5A)

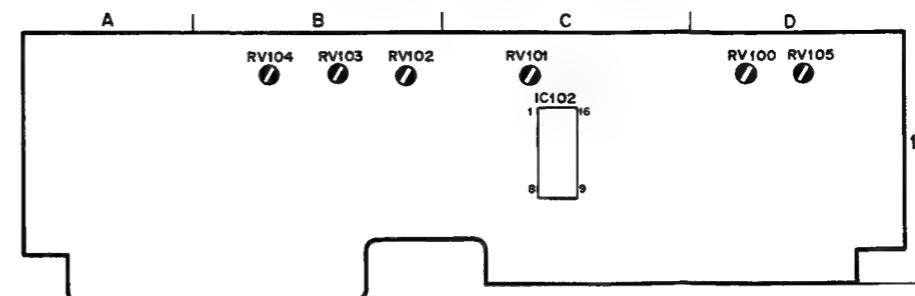
## 5-2-2. Backup Frequency Adjustment

### [CONNECTION]

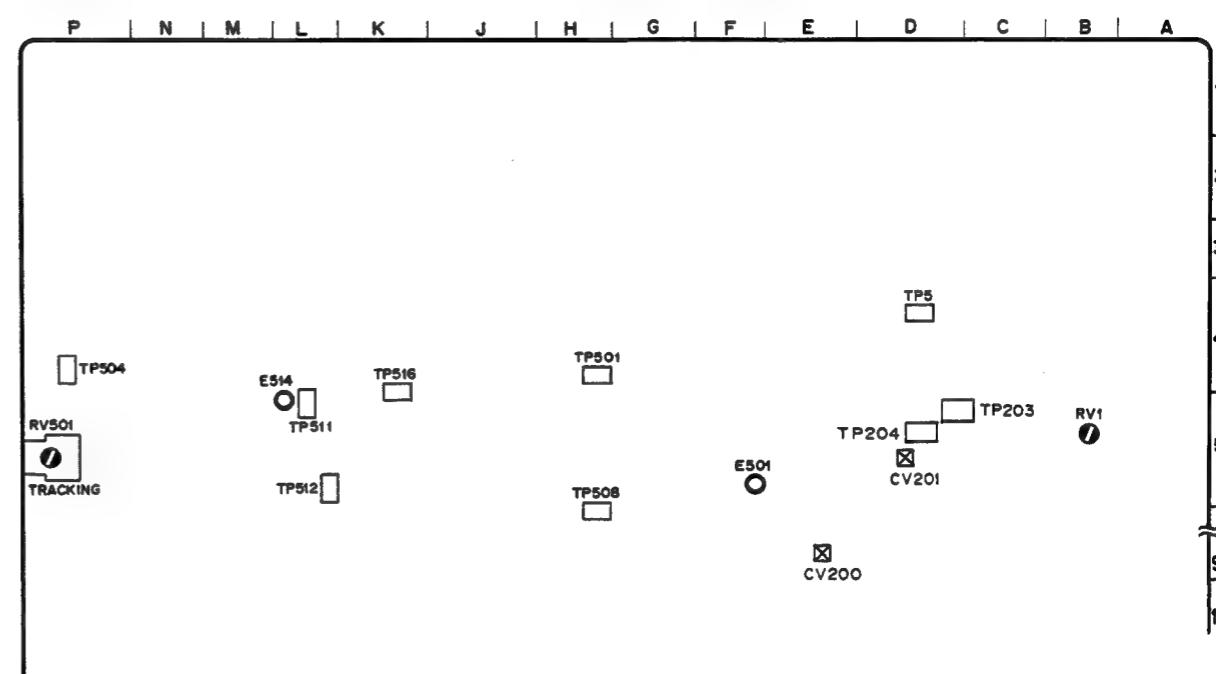


Preparations for adjustment	Specifications	Adjustments
STEP1. • Disconnect the external power and battery pack from the U.U.T.	TP203/SST-1 (D-5)	(check)
Oscilloscope; CH-1....TP203/SST-1 (D-5) TRIG....CH-1	At approximately one minute after the extraction of power. $A=3.2 \pm 0.1 \text{Vpp}$ (REF. Frequency=25Hz approx.)	
STEP2. • Same as step 1 except the following.  Video Signal Generator (TSG-170A) Oscilloscope; CH-1....TP203/SST-1 (D-5) CH-2....Black burst signal (TSG-170A) TRIG....CH-1	Oscilloscope CH-2; Black burst signal  CH-2 Waveform    (The waveform may move horizontally)	Adjust the sweep of the oscilloscope so that H period of CH-2 waveform equals to ten divisions on a scale.
STEP3. • Same as step 2.	Test points; Same as STEP2.   Horizontal speed of the CH-2 waveform   $\leq 1/2 \text{ DIV./sec}$	CV201/SST-1 (D-5)
STEP4. • Connect the external power or battery pack to the U. U. T. • Power sw.; OFF • Others ; Same as STEP3.	Test points; Same as STEP3.   Horizontal speed of the CH-2 waveform   $\leq 1/2 \text{ DIV./sec}$	CV200/SST-1 (E-9)

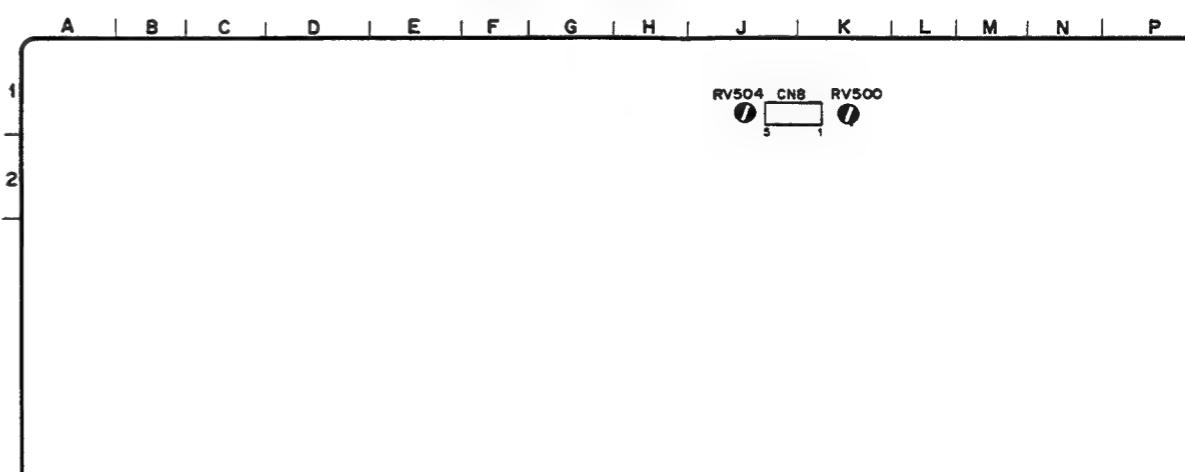
### Locations of RVs and IC on PSW-12 board. (B SIDE)



### Locations of TPs, Es, CVs and RVs on SST-1 board. (A SIDE)



### Locations of CN and RVs on SST-1 board. (B SIDE)



## SECTION 6 SERVO SYSTEM ALIGNMENT

### [Equipment Required]

- Test pattern generator (SHIBASOKU 588A/2 or equivalent) or a test pattern and a video camera)
- PAL Video signal generator (TEKTRONIX TSG-271 or equivalent)
- Digital voltmeter
- Dual trace oscilloscope
- Video monitor
- Shorting clip
- Torque meter
- Tension regulator adjustment tool (J-6036-870-A)
- Blank tape
- Alignment tape CR2-1B PS (8-960-096-51)

### Contents

VIDEO TRACK	AUDIO TRACK	TIME CODE TRACK	CTL TRACK
Y; 4MHz signal C; 5MHz signal	Blank	CTL	CTL

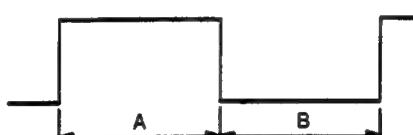
### [NOTE]

1. During servo system alignment, connect standard video signal to the VIDEO IN and a video monitor to the VIDEO OUT2.
2. In the SERVO ADJ. mode, the display on the video monitor and the functions of S501 and S502 on the SST-1 board are given below:
  - Video monitor display : The SERVO ADJ. ADDRESS in parentheses has a decimal number beginning with 01. Addresses 01 to 15 show the adjustment item numbers and 21 to 35 show the check item numbers corresponding to 01 to 15.  
The SERVO ADJ. DATA in parentheses has a four-digit hexadecimal number from 0000 to FFFF, which shows the adjustment value.
  - S501 : Singly used for address control. Press this for about 1 sec and release to increase the address. Press this for about 2 sec and release to decrease the address. Press and hold down this for more seconds and release to return to 01.
  - S502 : Singly used for data latch. This causes the adjustment value to be latched into RAM.
  - S501/502 : Press S501 and S502 simultaneously to store the latched adjustment value into non-volatile memory and switch from SERVO ADJ. mode to DIAGNOSTIC mode or vice versa.
3. To access the TP and VR elements (A side) of the SST-1 board, open the video board assembly (VRP-1/TBC-19) using an extension cable (See Paragraph 1-10-2).

## 6-1. CAPSTAN OFFSET ADJUSTMENT (1)

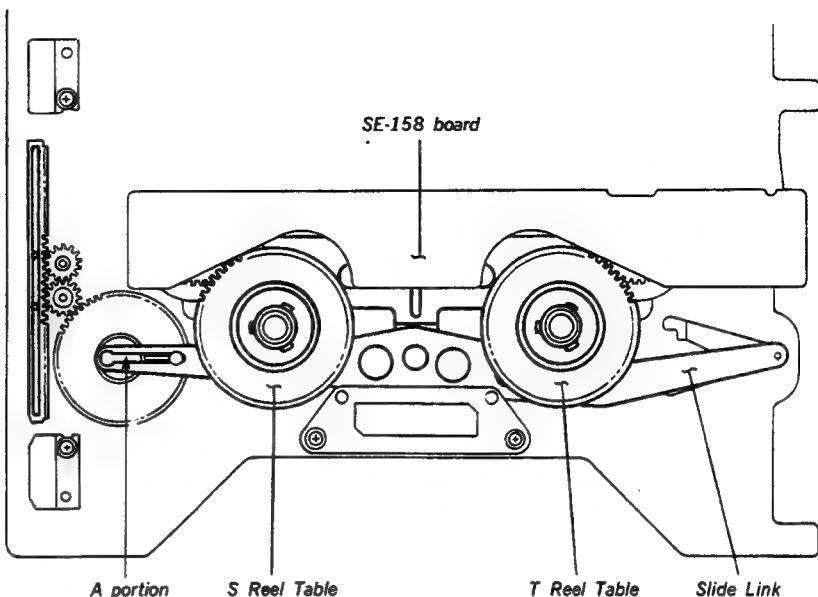
Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• DIAG SW/Front Panel; ON</li> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for about 2 sec. and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>The videomonitor should present the following display:</p> <pre>DIAGNOSTIC MODE SYSCON MPU --V x, x SERVO MPU --V x, x INTERFACE MPU--V x, x</pre> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>SERVO ADJ. ADDRESS ( 01 )</p> <p>SERVO ADJ. DATA ( xxxx )</p> </div>	
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• MODE; EJECT (UNTHREADING END)</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; margin-top: 10px;"> <p>SERVO ADJ. ADDRESS ( 01 )</p> <p>SERVO ADJ. DATA ( xxxx )</p> </div> <p>The numeric value in DATA field should become a stationary value between 0000 and FFFF. Record the value.</p>	
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul> <p>Oscilloscope</p>	<p>TP501/SST-1 (H-4A)</p>  <p>A=B±5% (Duty; 50±5%)</p>	(CHECK)
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 5.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 4.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-2. CAPSTAN OFFSET ADJUSTMENT (2)

Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; text-align: center;"> <b>SERVO ADJ. ADDRESS</b>            ( 0 2 )  <b>SERVO ADJ. DATA</b>            ( x x x x )         </div>	<p>Press and release the following switch twice to set the address to 02.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• MODE; EJECT (UNTHREADING END)</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should become a stationary value between 0000 and FFFF. Record the value.</p>	
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul> <p>Oscilloscope</p>	<p>TP508/SST-1 (H-6)</p>  <p>A=B±5% (Duty; 50±5%)</p>	(CHECK)
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 5.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 4.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec. and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

### 6-3. S REEL TORQUE ADJUSTMENT

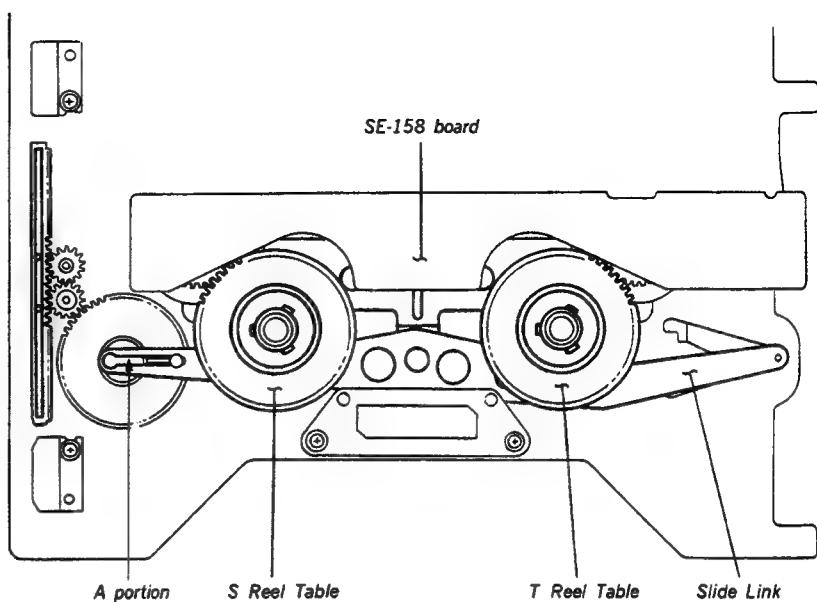
Tool: Torque meter



Preparations for adjustment	Specifications	Adjustment
<b>STEP 1.</b> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<b>VIDEO MONITOR DISPLAY</b> <div style="border: 1px dashed black; padding: 5px;"> <p>SERVO ADJ. ADDRESS ( 0 3 )</p> <p>SERVO ADJ. DATA ( x x x x )</p> </div>	Press and release the following switch thrice to set the address to 03. • S501/SST-1 (K-1B)
<b>STEP 2.</b> <ul style="list-style-type: none"> <li>• Set a torque meter on the S reel shaft.</li> <li>• MODE; Same as STEP 1.</li> </ul>		(CHECK)
<b>STEP 3.</b> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> <li>• OTHER; Same as STEP 2.</li> </ul>	The torque value while the S reel table is rotating slowly (at approx. 0.5 rps) counterclockwise; $205 \pm 5 \text{ gf} \cdot \text{cm}$ After adjustment, record the value of SERVO ADJ. DATA displayed on video monitor.	<span style="color: red;">●</span> RV504/SST-1 (J-1B)
<b>STEP 4.</b> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> <li>• Remove the torque meter.</li> </ul>	<b>VIDEO MONITOR DISPLAY</b> The numeric value in DATA field should toggle between the stationary value in Step 3 and 0000 at intervals of approx. 1 sec.	Press the following switch for approx. 1 sec. and release. • S502/SST-1 (J-1B)
<b>STEP 5.</b> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 4.</li> </ul>	<b>VIDEO MONITOR DISPLAY</b> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 3 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	Press the following switches simultaneously for approx. 2 sec and release. • S501/SST-1 (K-1B) • S502/SST-1 (J-1B)

#### 6-4. T REEL TORQUE ADJUSTMENT

Tool : Torque meter



Preparations for adjustment	Specifications	Adjustment
<b>STEP 1.</b> <ul style="list-style-type: none"> <li>• MODE ; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec. and release to enter SERVO ADJ. mode.</li> </ul> S501/SST-1 (K-1B) S502/SST-1 (J-1B)	<b>VIDEO MONITOR DISPLAY</b> <div style="border: 1px dashed black; padding: 5px;"> <b>SERVO ADJ. ADDRESS</b>            (04)  <b>SERVO ADJ. DATA</b>            (xxxx)         </div>	Press and release the following switch four times to set the address to 04. <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<b>STEP 2.</b> <ul style="list-style-type: none"> <li>• Set a torque meter on the T reel shaft.</li> <li>• MODE ; Same as STEP 1.</li> </ul>		(CHECK)
<b>STEP 3.</b> <ul style="list-style-type: none"> <li>• MODE ; Same as STEP 2.</li> <li>• OTHER ; Same as STEP 2.</li> </ul>	The torque value while the T reel table is rotating slowly (at approx. 0.5 rps) clockwise: $205 \pm 5 \text{ gf} \cdot \text{cm}$ After adjustment, record the value of SERVO ADJ. DATA displayed on video monitor.	<b>●</b> RV504/SST-1 (J-1B)
<b>STEP 4.</b> <ul style="list-style-type: none"> <li>• MODE ; Same as STEP 3.</li> <li>• Remove the torque meter.</li> </ul>	<b>VIDEO MONITOR DISPLAY</b> The numeric value in DATA field should toggle between the stationary value in Step 3 and 0000 at intervals of approx. 1 sec.	Press the following switch for approx. 1 sec. and release. <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<b>STEP 5.</b> <ul style="list-style-type: none"> <li>• Same as STEP 4.</li> </ul>	<b>VIDEO MONITOR DISPLAY</b> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 3 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	Press the following switches simultaneously for approx. 2 sec and release. <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-5. S REEL OFFSET ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; text-align: center;"> <b>SERVO ADJ. ADDRESS</b>            ( 0 5 )  <b>SERVO ADJ. DATA</b>            ( x x x x )         </div>	<p>Press and release the following switch five times to set the address to 05.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• MODE; EJECT (UNTHREADING END)</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should change and then stop around 0000 (HEX). Record the stationary value.</p>	
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-6. T REEL OFFSET ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment		
<p>STEP 1.</p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <table border="1"> <tr> <td>SERVO ADJ. ADDRESS ( 0 6 )</td> </tr> <tr> <td>SERVO ADJ. DATA ( x x x x )</td> </tr> </table>	SERVO ADJ. ADDRESS ( 0 6 )	SERVO ADJ. DATA ( x x x x )	<p>Press and release the following switch six times to set the address to 06.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
SERVO ADJ. ADDRESS ( 0 6 )				
SERVO ADJ. DATA ( x x x x )				
<p>STEP 2.</p> <ul style="list-style-type: none"> <li>• MODE; EJECT (THREADING END)</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should change and then stop around 0000 (HEX). Record the stationary value.</p>			
<p>STEP 3.</p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p>		
<p>STEP 4.</p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the stationary value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>		

## 6-7. S REEL FRICTION ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; width: fit-content;"> <p>S E R V O   A D J .   A D D R E S S ( 0 7 )</p> <p>S E R V O   A D J .   D A T A ( x x x x )</p> </div>	<p>Press and release the following switch seven times to set the address to 07.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 1.</li> </ul>	<ul style="list-style-type: none"> <li>The reel table which was rotating clockwise should stop.</li> <li>In addition, with a hand, rotate the reel table clockwise and check that it will stop. Repeat this procedure several times by changing the gear engagement position.</li> <li>Record the numeric value in DATA field as the final value.</li> </ul>	<p>● RV504/SST-1 (J-1B)</p>
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-8. T REEL FRICTION ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment		
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <table border="1"> <tr> <td><b>SERVO ADJ. ADDRESS</b> ( 0 8 )</td> </tr> <tr> <td><b>SERVO ADJ. DATA</b> ( x x x x )</td> </tr> </table>	<b>SERVO ADJ. ADDRESS</b> ( 0 8 )	<b>SERVO ADJ. DATA</b> ( x x x x )	<p>Press and release the following switch eight times to set the address to 08.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<b>SERVO ADJ. ADDRESS</b> ( 0 8 )				
<b>SERVO ADJ. DATA</b> ( x x x x )				
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 1.</li> </ul>	<ul style="list-style-type: none"> <li>The reel table which was rotating counterclockwise should stop.</li> <li>In addition, with a hand, rotate the reel table counter-clockwise and check that it will stop. Repeat this procedure several times by changing the gear engagement position.</li> <li>Record the numeric value in DATA field as the final value.</li> </ul>	<p>⑦ RV504/SST-1 (J-1B)</p>		
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 2.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>		
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</p> <p>In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</p>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>		

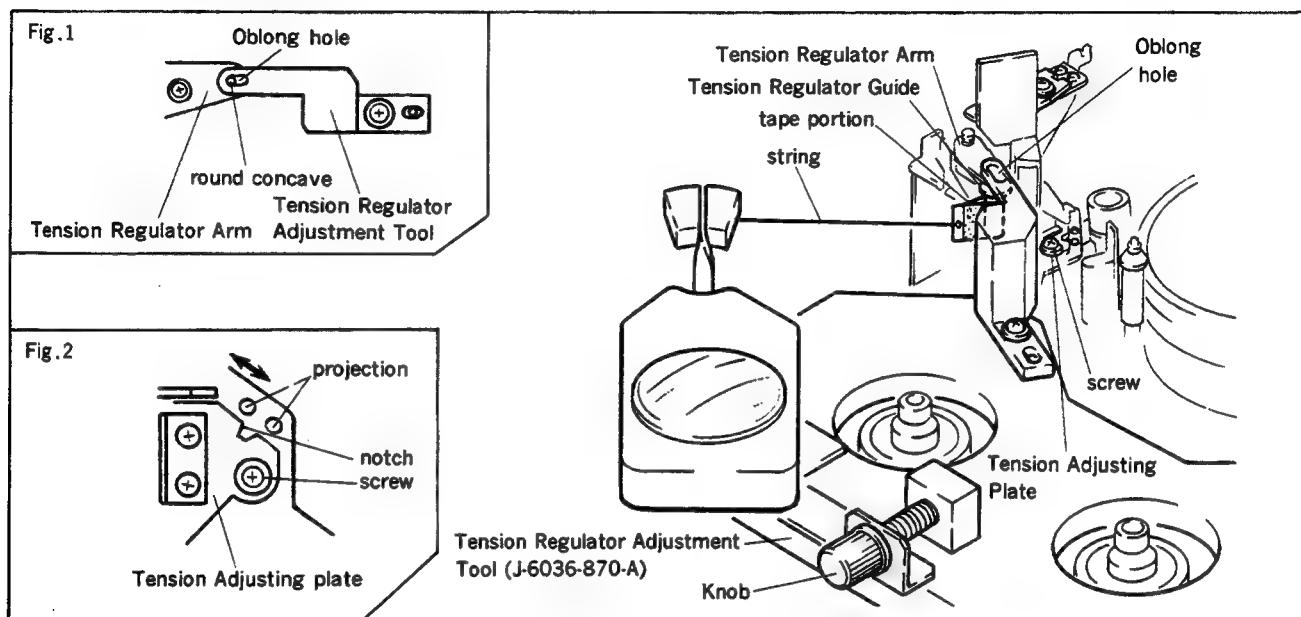
## 6-9. TENSION REGULATOR ADJUSTMENT

### 6-9-1. Tension Offset Adjustment

Preparations for adjustment	Specifications	Adjustment
STEP 1. • Use an extension cable and open the video board to allow access to TP of the SST-1 board.		
STEP 2. • MODE; STAND-BY OFF STOP • Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.  S501/SST-1 (K-1B) S501/SST-1 (J-1B)	VIDEO MONITOR DISPLAY  SERVO ADJ. ADDRESS ( 0 9 )  SERVO ADJ. DATA ( x x x x )	Press and release the following switch nine times to set the address to 09. • S501/SST-1 (K-1B)
STEP 3. • MODE; Same as STEP 2. • RV500/SST-1 (K-1B); mechanical center  Digital voltmeter	TP516/SST-1 (K-4)  2.5±0.2Vdc  Record the numeric value in DATA field as the final value.	• RV504/SST-1 (J-1B)
STEP 4. • MODE; Same as STEP 3.	VIDEO MONITOR DISPLAY  The numeric value in DATA field should toggle between the final value in Step 3 and 0000 at intervals of approx. 1 sec.	Press the following switch for approx. 1 sec. and release. • S502/SST-1 (J-1B)
STEP 5. • MODE; Same as STEP 4. • After adjustment, remove the extension cable and replace the VRP board.	VIDEO MONITOR DISPLAY  The numeric value in DATA field should toggle between the final value in Step 3 and 0000 at intervals of approx. 0.5 sec.  In a while, the SERVO ADJ. display disappears returning to DIAG. mode.	Press the following switches simultaneously for approx. 2 sec. and release. • S501/SST-1 (K-1B) • S502/SST-1 (J-1B)

### 6-9-2. Tension Position Check

Mode : STAND-BY OFF STOP (THREADING END)  
 Tool : Tension Regulator Adjustment Tool (J-6036-870-A)  
 Flatblade Screwdriver of  $5 \pm 1$  mm tip width



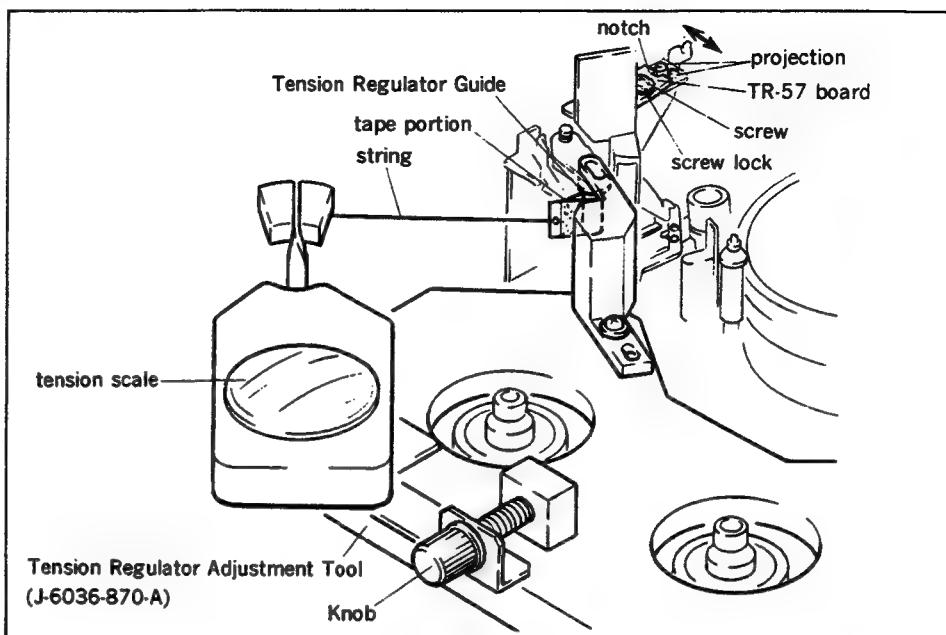
Preparations for adjustment	Specifications	Adjustment
<b>STEP 1.</b> • Set the tension regulator adjustment tool (J-6036-870-A) as shown above, and put tape on the tension regulator guide.	1. Tool meter scale=43g 2. Flick the thread lightly with fingers and check that the indicated value 43g is not changed. 3. The round concave of the tension regulation arm should be placed in the oblong hole of the tool. (Fig. 1)  If the specification is not met, perform Steps 2 and after.	SPEC.1 ● Knob/Tension Regulator Adjustment Tool SPEC.2,3 (CHECK)
<b>STEP 2.</b> • Loosen the screw of tension adjusting plate about 1/2 to 1 turn. • Insert the screwdriver into between the notch of the tension regulation plate and the two dowels (projection). Move the plate in the direction of the arrow and place the round concave of the tension regulation arm in the center of the oblong hole of the tool. (Fig. 2)	Tool meter scale=43g After adjustment, tighten the locking screw.	● Knob/Tension Regulator Adjustment Tool
<b>STEP 3.</b> • Same as STEP 1. • After adjustment, apply a proper amount of screw lock on the locking screw.	Same as STEP 1.	

### 6-9-3. Tension Sensitivity Adjustment

Mode : STAND-BY OFF STOP (THREADING END)

Tool : Tension Regulator Adjustment Tool (J-6036-870-A)

Flatblade Screwdriver of  $5 \pm 1$ mm tip width



Preparations for adjustment	Specifications	Adjustment
STEP 1. • Set the tension regulator adjustment tool (J-6036-870-A) as shown above, and put tape on the tension regulator guide.	1. Tool meter scale=48g 2. Flick the thread lightly with fingers and check that the indicated value 48g is not changed.	SPEC.1 ① Knob/Tension Regulator Adjustment Tool SPEC.2 (CHECK)
STEP 2. • Loosen the screw of TR-57 board about 1/2 to 1 turn.	TP516/SST-1 (K-4) (GND) E514/SST-1 (L-5)  2.47 to 2.53Vdc	② TR board location (at upper right of the figure) Insert the screwdriver into between the notch of the TR board and the two dowels (projection), and move the board in the direction of the arrow.
Digital voltmeter		
STEP 3. • Tighten the screw. • After adjustment, apply a proper amount of screw lock on the locking screw.	When the indicated value of the tool meter is 48g, the voltage value in Step 2 should be satisfied.	(CHECK)
STEP 4. • MODE: Same as STEP 3.	Tool meter indication: 27g	③ Knob/Tension Regulator Adjustment Tool
STEP 5. • Same as STEP 4. Digital voltmeter	TP516/SST-1 (K-4) (GND) E514/SST-1 (L-5)  1.72±0.1Vdc	④ RV500/SST-1 (K-1B)

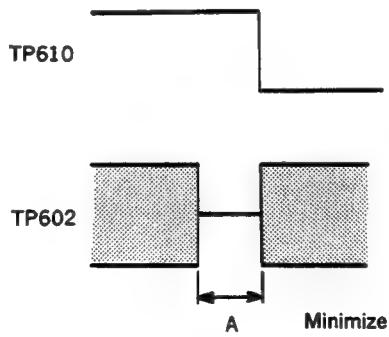
## 6-10. CAPSTAN FREE SPEED ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment		
<p>STEP 1.</p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <table border="1"> <tr> <td>SERVO ADJ. ADDRESS ( 1 0 )</td> </tr> <tr> <td>SERVO ADJ. DATA ( x x x x )</td> </tr> </table>	SERVO ADJ. ADDRESS ( 1 0 )	SERVO ADJ. DATA ( x x x x )	<p>Press and release the following switch ten times to set the address to 10.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
SERVO ADJ. ADDRESS ( 1 0 )				
SERVO ADJ. DATA ( x x x x )				
<p>STEP 2.</p> <ul style="list-style-type: none"> <li>• Insert a alignment tape CR2-1B.</li> <li>• MODE; PLAY</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should be between FFF0 and 000F. (Center value=0000)</li> <li>• Record the numeric value in DATA field as the final value.</li> </ul>	<p>• RV504/SST-1 (J-1B)</p>		
<p>STEP 3.</p> <ul style="list-style-type: none"> <li>• Same as Step 2 except the following.</li> <li>• MODE; STOP</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>		
<p>STEP 4.</p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 3.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 05 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec. and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>		

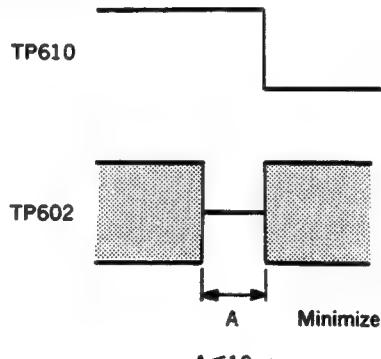
## 6-11. SV TRACKING CENTER ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment		
<p>STEP 1.</p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <table border="1"> <tr> <td>S E R V O   A D J .   A D D R E S S ( 1 1 )</td> </tr> <tr> <td>S E R V O   A D J .   D A T A ( x x x x )</td> </tr> </table>	S E R V O   A D J .   A D D R E S S ( 1 1 )	S E R V O   A D J .   D A T A ( x x x x )	<p>Press and release the following switch eleven times to set the address to 11.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
S E R V O   A D J .   A D D R E S S ( 1 1 )				
S E R V O   A D J .   D A T A ( x x x x )				
<p>STEP 2.</p> <ul style="list-style-type: none"> <li>• Insert a alignment tape CR2-1B.</li> <li>• TRACON VR/Left Side Panel ; center clicked position</li> <li>• MODE; PLAY</li> </ul>	Record the numeric value in DATA field as the final value.	(AUTO)		
<p>STEP 3.</p> <ul style="list-style-type: none"> <li>• MODE; STOP</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>		
<p>STEP 4.</p> <ul style="list-style-type: none"> <li>• Same as STEP 3.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>		

## 6-12. REC HEAD SWITCHING POSITION ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
STEP 1. <ul style="list-style-type: none"> <li>Withdraw CN8/VRP-1 (E-9) and connect to the adjacent CN601/VRP-1 (red) (G-9).</li> <li>Connect between CN603-(5) pin on VRP-1 (K-8) and GND with a shorting clip.</li> </ul>		
STEP 2. <ul style="list-style-type: none"> <li>MODE; STAND-BY OFF STOP (THREADING END)</li> <li>Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>SERVO ADJ. ADDRESS ( 1 2 )</p> <p>SERVO ADJ. DATA ( x x x x )</p> </div>	<p>Press and release the following switch twelve times to set the address to 12.</p> <ul style="list-style-type: none"> <li>S501/SST-1 (K-1B)</li> </ul>
STEP 3. <ul style="list-style-type: none"> <li>Insert an alignment tape CR2-1B.</li> <li>MODE; PLAY</li> </ul> <p>Oscilloscope TRIG....TP610/VRP-1 (H-9)</p>	<p>TP610/VRP-1 (H-9) TP602/VRP-1 (H-8)</p>  <p>A <math>\leq 10\mu s</math></p> <p>After adjustment, record the value in DATA field on the monitor screen.</p>	<p>RV504/SST-1 (J-1B)</p>
STEP 4. <ul style="list-style-type: none"> <li>MODE; Same as STEP 3.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should toggle between the final value in Step 3 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>S502/SST-1 (J-1B)</li> </ul>
STEP 5. <ul style="list-style-type: none"> <li>Same as STEP 4.</li> <li>After adjustment, remove the shorting clip between CN603-(5) pin and GND, and replace CN8.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec. and release.</p> <ul style="list-style-type: none"> <li>S501/SST-1 (K-1B)</li> <li>S502/SST-1 (J-1B)</li> </ul>

## 6-13. PB HEAD SWITCHING POSITION ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; margin-bottom: 10px;"> <b>SERVO ADJ. ADDRESS</b>            ( 1 3 )  <b>SERVO ADJ. DATA</b>            ( x x x x )         </div>	<p>Press and release the following switch thirteen times to set the address to 13.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• Insert an alignment tape CR2-1B.</li> <li>• MODE; PLAY</li> </ul> <p>Oscilloscope TRIG....TP610/VRP-1 (H-9)</p>	<p>TP610/VRP-1 (H-9) TP602/VRP-1 (H-8)</p>  <p>After adjustment, record the value in DATA field on the monitor screen.</p>	<p>• RV504/SST-1 (J-1B)</p>
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; STOP</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SS-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-14. PB CTL DELAY ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE ; STAND-BY OFF STOP. (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p><b>VIDEO MONITOR DISPLAY</b></p> <div style="border: 1px dashed black; padding: 5px; width: fit-content;"> <p>S E R V O   A D J .   A D D R E S S ( 1 4 )</p> <p>S E R V O   A D J .   D A T A ( x x x x )</p> </div>	<p>Press and release the following switch fourteen times to set the address to 14.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• Insert an alignment tape CR2-1B.</li> <li>• MODE ; PLAY</li> </ul> <p>Oscilloscope TRIG....TP610/VRP-1 (H-9)</p>	<p>TP610/VRP-1 (H-9) TP602/VRP-1 (H-8)</p> <p>Maximize A and A'</p> <p>After adjustment, record the value in DATA field on the monitor screen.</p>	<p>⑦RV504/SST-1 (J-1B)</p>
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE ; STOP</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <p>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• Same as STEP 3.</li> </ul>	<p><b>VIDEO MONITOR DISPLAY</b></p> <ul style="list-style-type: none"> <li>• The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>• In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec. and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-15. SV REC CONTINUITY ADJUSTMENT

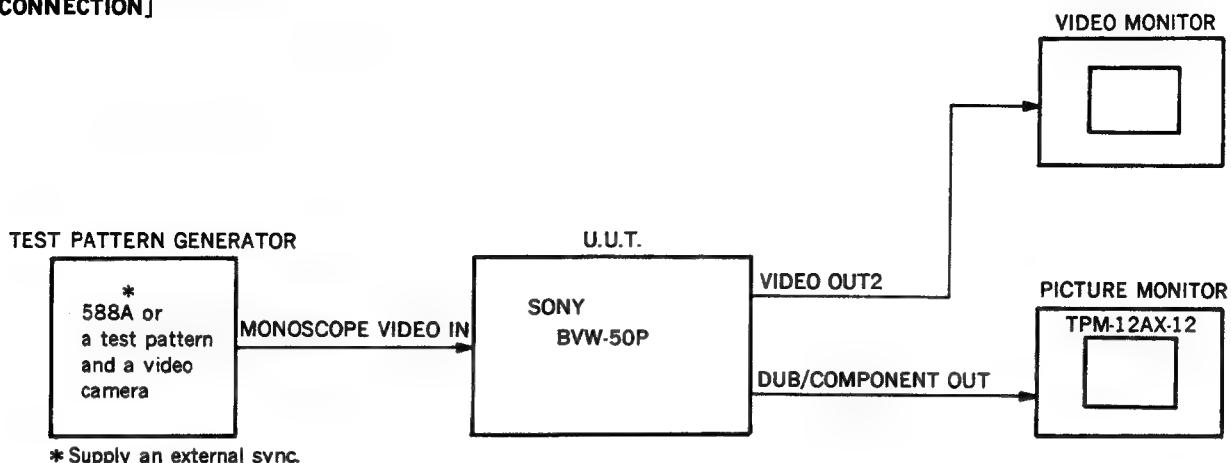
Preparations for adjustment	Specifications	Adjustment
<p><b>STEP 1.</b></p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <div style="border: 1px dashed black; padding: 5px; margin-left: 10px;"> <b>SERVO ADJ. ADDRESS</b>            ( 1 5 )  <b>SERVO ADJ. DATA</b>            ( x x x x )         </div>	<p>Press and release the following switch fifteen times to set the address to 15.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
<p><b>STEP 2.</b></p> <ul style="list-style-type: none"> <li>• Insert a blank tape (BCT-20M).</li> <li>• MODE; Enter REC mode. Then, turn PAUSE ON. When the screen stops, turn PAUSE OFF. Repeat this procedure.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <p>TV monitor display</p> <p>Repeat this procedure until the numeric value in DATA field has almost no change. Record the value.</p>	
<p><b>STEP 3.</b></p> <ul style="list-style-type: none"> <li>• MODE; Maintain the mode at the end of STEP 2.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> </ul>	<p>Press the following switch for approx. 1 sec. and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>
<p><b>STEP 4.</b></p> <ul style="list-style-type: none"> <li>• Same as STEP 3.</li> </ul>	<p>VIDEO MONITOR DISPLAY</p> <ul style="list-style-type: none"> <li>The numeric value in DATA field should toggle between the final value in Step 2 and 0000 at intervals of approx. 0.5 sec.</li> <li>In a while, the SERVO ADJ. display disappears returning to DIAG. mode.</li> </ul>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>

## 6-16. ADJUSTING DATA CHECK

Preparations for adjustment	Specifications	Adjustment																																
<p>STEP 1.</p> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode.</li> </ul> <p>S501/SST-1 (K-1B) S502/SST-1 (J-1B)</p>	<p>VIDEO MONITOR DISPLAY</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">SERVO ADJ. ADDRESS ( 21 )</td> </tr> <tr> <td style="text-align: center;">SERVO ADJ. DATA ( x x x x )</td> </tr> </table>	SERVO ADJ. ADDRESS ( 21 )	SERVO ADJ. DATA ( x x x x )	<p>Press and release the following switch twenty one times to set the address to 21.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>																														
SERVO ADJ. ADDRESS ( 21 )																																		
SERVO ADJ. DATA ( x x x x )																																		
<p>STEP 2.</p> <ul style="list-style-type: none"> <li>• MODE; Same as STEP 1.</li> </ul>	<p>There shall be no difference in value between the data of the adjustment item and that of the corresponding check.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>ADJUST ADDRESS</th> <th>CHECK ADDRESS</th> </tr> </thead> <tbody> <tr><td>01</td><td>21</td></tr> <tr><td>02</td><td>22</td></tr> <tr><td>03</td><td>23</td></tr> <tr><td>04</td><td>24</td></tr> <tr><td>05</td><td>25</td></tr> <tr><td>06</td><td>26</td></tr> <tr><td>07</td><td>27</td></tr> <tr><td>08</td><td>28</td></tr> <tr><td>09</td><td>29</td></tr> <tr><td>10</td><td>30</td></tr> <tr><td>11</td><td>31</td></tr> <tr><td>12</td><td>32</td></tr> <tr><td>13</td><td>33</td></tr> <tr><td>14</td><td>34</td></tr> <tr><td>15</td><td>35</td></tr> </tbody> </table> <p>If you find any difference, repeat the appropriate adjustment.</p>	ADJUST ADDRESS	CHECK ADDRESS	01	21	02	22	03	23	04	24	05	25	06	26	07	27	08	28	09	29	10	30	11	31	12	32	13	33	14	34	15	35	<ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul> <p>(CHECK)</p>
ADJUST ADDRESS	CHECK ADDRESS																																	
01	21																																	
02	22																																	
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04	24																																	
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<p>STEP 3.</p> <ul style="list-style-type: none"> <li>• Same as STEP 2.</li> </ul>	<p>Returning to DIAG. mode.</p>	<p>Press the following switches simultaneously for approx. 2 sec and release.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> <li>• S502/SST-1 (J-1B)</li> </ul>																																

## 6-17. RECORDING PICTURE SPLIT ADJUSTMENT

Perform this adjustment only when picture split occurs after head drum replacement.  
**[CONNECTION]**



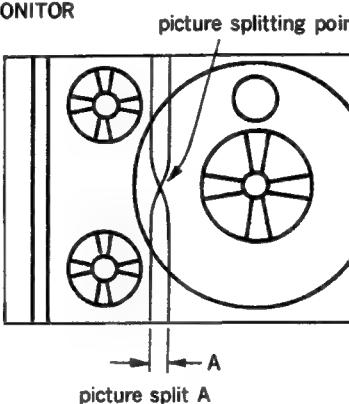
Preparations for adjustment	Specifications	Adjustments
<b>STEP 1.</b> <ul style="list-style-type: none"> <li>• MODE; STAND-BY OFF STOP (THREADING END)</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode</li> </ul> S501/SST-1 (K-1B) S502/SST-1 (J-1B)	<b>VIDEO MONITOR DISPLAY</b> <div style="border: 1px dashed black; padding: 5px; text-align: center;">       SERVO ADJ. ADDRESS        ( 1 6 )        SERVO ADJ. DATA        ( x x x x )     </div>	Press and release the following switch sixteen times to set the address to 16. • S501/SST-1 (K-1B)
<b>STEP 2.</b> <ul style="list-style-type: none"> <li>• VIDEO IN; MONOSCOPE</li> <li>• CAMERA/LINE SW; LINE</li> <li>• MODE SW; PB/EE</li> <li>• Insert a BCT-20M blank tape, record it for 3 minutes.</li> <li>• After recorded, remove the cassette tape and POWER switch to OFF.</li> <li>• Open the VRP-1 board, remount the CN601 plug (white, 12pin) on VRP-1 board from CN8W receptacle (white) to CN601R receptacle (red).</li> <li>• Connect between CN603-(5) pin on VRP-1 board and GND with a shorting clip.</li> </ul>		
<b>STEP 3.</b> <ul style="list-style-type: none"> <li>• POWER SW; ON</li> <li>• DIAG SW; ON</li> <li>• Press the following switches simultaneously for approx. 2 sec and release to enter SERVO ADJ. mode</li> </ul> S501/SST-1 (K-1B) S502/SST-1 (J-1B)	<b>VIDEO MONITOR DISPLAY</b> <div style="border: 1px dashed black; padding: 5px; text-align: center;">       SERVO ADJ. ADDRESS        ( 1 6 )        SERVO ADJ. DATA        ( x x x x )     </div>	Press and release the following switch sixteen times to set the address to 16. • S501/SST-1 (K-1B)

## 6-17. RECORDING PICTURE SPLIT ADJUSTMENT (Continued)

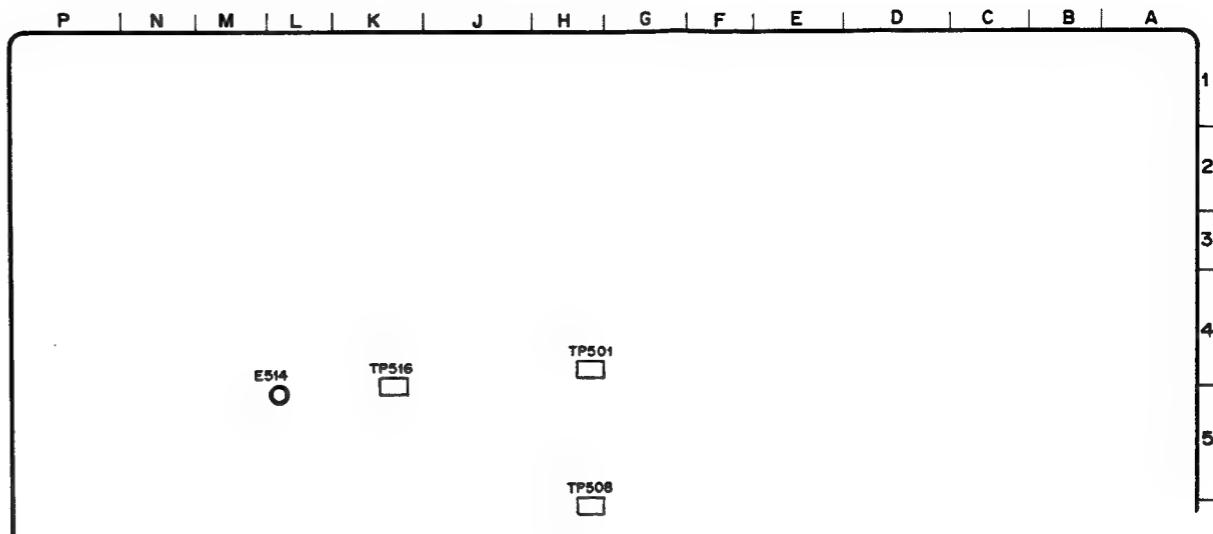
Preparations for adjustment	Specifications	Adjustments		
STEP 4. • Play back the recorded portion of STEP 2.	<p>PICTURE MONITOR</p> <p>Check the picture splitting point and mark on picture monitor.</p>			
STEP 5. • MODE; STAND-BY OFF STOP	<p>VIDEO MONITOR DISPLAY</p> <table border="1"> <tr> <td>SERVO ADJ. ADDRESS ( 17 )</td> </tr> <tr> <td>SERVO ADJ. DATA ( x x x x )</td> </tr> </table>	SERVO ADJ. ADDRESS ( 17 )	SERVO ADJ. DATA ( x x x x )	<p>Press and release the following switch seventeen times to set the address to 17.</p> <ul style="list-style-type: none"> <li>• S501/SST-1 (K-1B)</li> </ul>
SERVO ADJ. ADDRESS ( 17 )				
SERVO ADJ. DATA ( x x x x )				
STEP 6. • Play back the recorded portion of STEP 2.	<p>PICTURE MONITOR</p> <p>The picture splitting point shall coincide with that of the STEP 4.</p>	<p>① RV504/SST-1 (J-1B)</p>		
STEP 7. • MODE; STAND-BY OFF STOP	<p>VIDEO MONITOR DISPLAY</p> <p>The numeric value in DATA field should toggle between the stationary value in step 6 and 0000 at intervals of approx. 1 sec.</p>	<p>Press the following switch for approx. 1 sec and release.</p> <ul style="list-style-type: none"> <li>• S502/SST-1 (J-1B)</li> </ul>		

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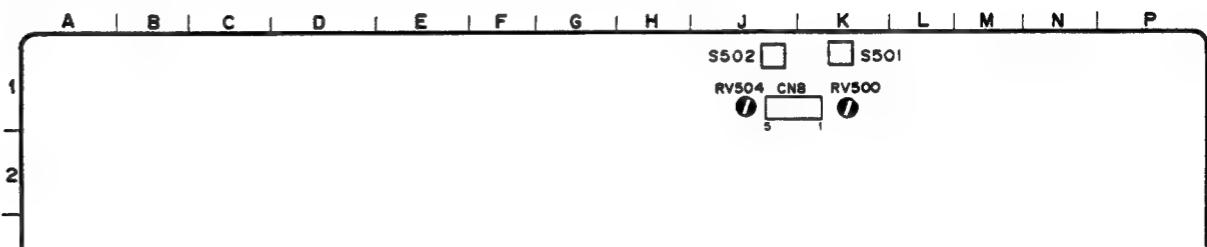
## 6-17. RECORDING PICTURE SPLIT ADJUSTMENT (Continued)

Preparations for adjustment	Specifications	Adjustments
STEP 8. • MODE; Same as STEP 7.	VIDEO MONITOR DISPLAY Adjust the numeric value in address field to 18.	Press and release the following switch eighteen times to set the address to 18. • S501/SST-1 (K-1B)
STEP 9. • Play back the recorded portion of STEP 2.	PICTURE MONITOR  In case the picture contains jitter: picture split + jitter ≤ 2μsec. • When the specification is satisfied, proceed to STEP 12. • If the specification is not satisfied, proceed to STEP 10.	① RV504/SST-1 (J-1B)
STEP 10. • MODE; STAN-BY OFF STOP	VIDEO MONITOR DISPLAY Adjust the numeric value in address field to 19.	Press and release the following switch nineteen times to set the address to 19. • S501/SST-1 (K-1B)
STEP 11. • Play back the recorded portion of STEP 2.	PICTURE MONITOR Same as STEP 9. If the specification is not satisfied, Check the FG and DRUM etc. of servo system because adjustment is impossible at this stage.	② RV504/SST-1 (J-1B)
STEP 12. • MODE; STAND-BY OFF STOP	VIDEO MONITOR DISPLAY The numeric value in DATA field should toggle between the final value in Step 9 and 0000 at intervals of approx. 1 sec.	Press the following switch for approx. 1 sec. and release. • S502/SST-1 (J-1B)
STEP 13. • MODE; Same as STEP 12. • After adjustment, remount the CN601 plug to CN8W receptacle and remove a shorting clip.	VIDEO MONITOR DISPLAY • The numeric value in DATA field should toggle between the final value in Step 12 and 0000 at intervals of approx. 0.5 sec. • In a while, the SERVO ADJ. display disappears returning to DIAG. mode.	Press the following switches simultaneously for approx. 2 sec. and release. • S501/SST-1 (K-1B) • S502/SST-1 (J-1B)

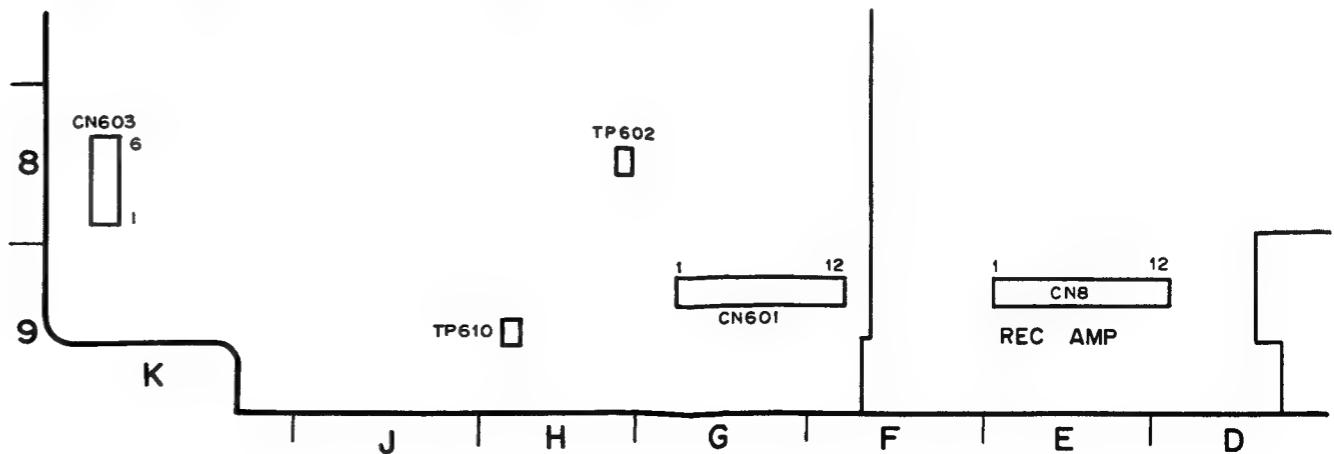
**Locations of TPs and Es on SST-1 board. (A SIDE)**



**Locations of CNs, Ss and Rvs on SST-1 board. (B SIDE)**



**Locations of CNs and TPs on VRP-1 board (A SIDE)**



## SECTION 7

### AUDIO SYSTEM ALIGNMENT

**[Equipment Required]**

- Audio oscillator
- AC/DC voltmeter
- Audio noise meter/Audio level meter
- Spectrum analyzer
- Dual-trace oscilloscope
- Blank tape BCT-20G (oxide), BCT-20M (metal)
- Alignment tape CR8-1A PS (8-960-098-45)

**Contents**

TIME min. sec	AUDIO TRACK	VIDEO TRACK	CTL TRACK
0: 00	1kHz, 0VU*1		
2: 55	Blank	—	CTL
3: 00			
	10kHz, -10VU		
4: 55	Blank	—	CTL
5: 00			
	1kHz, -20VU		
5: 55	Blank	—	CTL
6: 00			
	40Hz, -20VU**		
6: 25	Blank	—	CTL
6: 30			
	7kHz, -20VU*2		
6: 55	Blank	—	CTL
7: 00			
	10kHz, -20VU*2		
7: 25	Blank	—	CTL
7: 30			
	15kHz, -20VU*2		
7: 55	Blank	—	CTL
8: 00			
	1kHz, 0VU	—	1kHz, 0VU
10: 00			

**Notes:**

- \* 1. When this tape is reproduced in the audio reference level check or adjustment, the output level (0 dB) should be corrected according to the correction value as follows.

Example: Correction value = -0.5dB

$$\text{Output level} = 0\text{dB} - 0.5\text{dB} = -0.5\text{dB}$$

- \* 2. When this tape is reproduced in the audio frequency response check or adjustment, the output level should be corrected according to the correction value.

• Alignment tape CR8-1B PS (8-960-096-86)

Contents

TIME min. sec	AUDIO TRACK	AFM	CTL TRACK
0: 00	1kHz, 0VU*1	—	CTL
2: 55	Blank	—	CTL
3: 00	15kHz, 0VU	—	CTL
4: 55	Blank	—	CTL
5: 00	1kHz, -20VU	—	CTL
5: 55	Blank	—	CTL
6: 00	40Hz, -20VU*2	—	CTL
6: 25	Blank	—	CTL
6: 30	7kHz, -20VU*2	—	CTL
6: 55	Blank	—	CTL
7: 00	10kHz, -20VU*2	—	CTL
7: 25	Blank	—	CTL
7: 30	15kHz, -20VU*2	—	CTL
7: 55		—	CTL

Notes :

- \* 1. When this tape is reproduced in the audio reference level check or adjustment, the output level (0 dB) should be corrected according to the correction value as follows.

Example : Correction value = -0.5dB

$$\text{Output level} = 0\text{dB} - 0.5\text{dB} = -0.5\text{dB}$$

- \* 2. When this tape is reproduced in the audio frequency response check or adjustment, the output level should be corrected according to the correction value.

• Alignment tape CR5-1B PS (8-960-096-91)

Contents

TIME min. sec	VIDEO TRACK	AFM	CTL
0: 00	RF Sweep		
2: 00	60% H Sweep (CTDM)		
5: 00	Pulse & Bar (CTDM)	No-Signal	
8: 00	60 % Multi Burst		
11: 00	Pulse & Bar		
14: 00	100% Color Bars	400 Hz SINE WAVE 25 kHz DEVIATION	CTL
16: 30		75 kHz DEVIATION	
17: 00	50% Bowtie & 10T		
19: 00	Line 17 Signal		
22: 00	Quad Phase		
24: 00	Flat Field		
26: 00	100% Color Bar with Dropout		
28: 00	Composite H Sweep with VISC	No-Signal	
30: 00			

### [Switch Setting]

#### Front Panel

- CH-1 AUDIO SELECT switch ..... MANUAL
- CH-2 AUDIO SELECT switch ..... MANUAL
- LIGHT switch ..... OFF

#### Connector Panel

- CAMERA/LINE SELECT switch....LINE (CH-1 to CH-4)
- AUDIO IN LEVEL SELECT switch..+4dB (CH-1 to CH-4)
- AFM INPUT switch ..... CH-3/CH-4
- MODE switch ..... PB
- CH-4 OUT switch ..... CH-4
- +48V switch ..... OFF (CH-1 to CH-4)
- DOLBY NR switch.....OFF
- MONITOR switch ..... OFF (CH-1 to CH-4)
- CONFI switch ..... Y AUDIO
- VIDEO IN SELECT switch ..... LINE
- DUB switch.....CH-2
- SUPERIMPOSE switch.....OFF

#### AU-142 Board

- S201 ..... CH-1
- S202 ..... CP SW

#### VR-118 Board

- S302 ..... ON

These switches and controls should not be changed in position unless otherwise specified.

### [Information for Adjustment]

#### Blank Tape

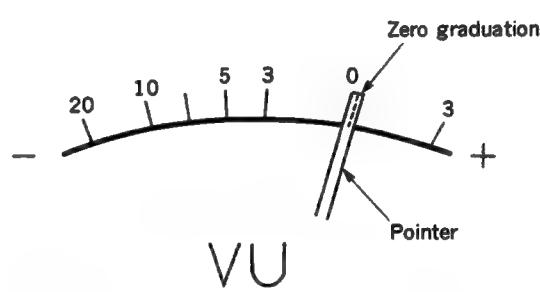
The "Blank Tape" described in the alignment procedures indicates a cassette tape on which no video/audio signals are recorded.

When performing the audio system alignment, on the AU-142 Board, remove the battery case on the rear panel side, then adjust the variable resistor RVxxx and the filter FLxxx from the rear panel side and adjust the LVxxx and Txxx from the front panel side.

The address of an adjustment part such as RVxxx on a board is represented by its identification alphabetic characters and number. Note that only adjustment parts provided on the A side have the character A after their numbers.

Examples: LV901/AU-142(A-4A) .....AU-142 board, address A-4 on the A side  
RV901/AU-142(E-4) .....AU-142 board, address E-4 on the B side

## 7-1. LEVEL METER CALIBRATION

Preparations for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>AUDIO IN; 1kHz, +4dBs (CH-1 to CH-4)</li> <li>MODE SW; PB/EE</li> <li>EE mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-1 to CH-4 AUDIO OUT (at 600-ohm load)</p> <p><math>+4.0 \pm 0.1\text{dBm}</math></p>	<p>CH-1: <math>\bullet</math> CH-1 REC VR on the front panel CH-2: <math>\bullet</math> CH-2 REC VR on the front panel CH-3: <math>\bullet</math> CH-3 REC VR on the front panel CH-4: <math>\bullet</math> CH-4 REC VR on the front panel</p>
<p>Step 2.</p> <ul style="list-style-type: none"> <li>Put the unit upright and place the meter in horizontal plane.</li> <li>Others; The same as for Step 1.</li> </ul>	<p>Audio level meter (CH-1 to CH-4)</p>  <p>The pointer should indicate zero.</p> <p>&lt;Reference&gt; Position balance When the unit is put horizontally and the meter vertically, the deviation of the pointer is to be within three pointer widths.</p>	<p>CH-1: <math>\bullet</math> RV202/KY-207 (E-3) CH-2: <math>\bullet</math> RV203/KY-207 (F-3) CH-3: <math>\bullet</math> RV204/KY-207 (G-3) CH-4: <math>\bullet</math> RV205/KY-207 (G-3)</p>

## 7-2. REC REFERENCE LEVEL SETTING

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>CH-1/CH-2 AUDIO IN; 1kHz, +4dBs</li> <li>MODE SW; PB/EE</li> <li>EE mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-1; TP201/AU-142 (F-3) CH-2; TP202/AU-142 (E-3)</p> <p><math>-10.0 \pm 0.1\text{dBs}</math></p>	<p>CH-1: CH-1 REC VR on the front panel =RV301/VR-118 (B-1A)</p> <p>CH-2: CH-2 REC VR on the front panel =RV302/VR-118 (C-1A)</p> <p>Caution: Once adjusted, the REC variable resistors should not be touched unless otherwise specified.</p>

### 7-3. AFM REC REFERENCE LEVEL SETTING (1)

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-3/CH-4 AUDIO IN ; 400Hz, +4dBs</li> <li>• MODE SW ; PB/EE</li> <li>• EE mode</li> </ul>	<p>Step 1.</p> <p>CH-3; TP601/AU-142 (E-2)            CH-4; TP651/AU-142 (E-2)</p> <p style="text-align: center;"><math>+19.8 \pm 0.2 \text{dBs}</math></p>	<p>CH-3: CH-3 REC VR on the front panel  <math>=\text{RV303}/\text{VR-118}</math> (D-1A)</p> <p>CH-4: CH-4 REC VR on the front panel  <math>=\text{RV304}/\text{VR-118}</math> (E-1A)</p> <p>Caution: Once adjusted, the REC variable resistors should not be touched unless otherwise specified.</p>
Audio oscillator Audio level meter	<p>Step 2.</p> <p>CH-3/CH-4 AUDIO OUT (at 600-ohm load)</p> <p style="text-align: center;"><math>+4.0 \pm 0.1 \text{dBm}</math></p>	<p>CH-3: <del>•</del> RV605/AU-142 (D-1)            CH-4: <del>•</del> RV655/AU-142 (D-2)</p>

### 7-4. MONITOR OUTPUT LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; 1 kHz, +4dBs</li> <li>• MONITOR CH-1 SW ; ON</li> <li>• Connect a 8-ohm stereo ear or head phone to the appropriate jack.</li> <li>• EE mode</li> </ul>	<p>HEAD PHONE OUT(X)/CN409-① pin/CP-164            (G)/CN409-③ pin/CP-164</p> <p style="text-align: center;"><math>-26.0 \pm 0.2 \text{dBs}</math></p>	<p><del>•</del> PHONE LEVEL VR on the connector panel  <math>=\text{RV1}/\text{CC-47}</math></p>
Audio oscillator Audio level meter		
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; No signals</li> <li>• MONITOR CH-1 SW ; OFF</li> <li>• Connect a 8-ohm stereo ear or head phone into the appropriate jack.</li> <li>• Insert a BCT-20G cassette tape and have wind finished.</li> <li>• PLAY mode</li> </ul>	<p>HEAD PHONE OUT(X)/CN409-① pin/CP-164            (G)/CN409-③ pin/CP-164</p> <p style="text-align: center;"><math>-36.0 \pm 0.5 \text{dBs}</math></p>	<p><del>•</del> RV551/AU-142 (F-4A)            (ALARM TONE LEVEL)</p>
Audio level meter		

## 7-5. LIMITER OPERATION LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>CH-1/CH-2 AUDIO IN; 1 kHz, -30dBs</li> <li>CH-1/CH-2 AUDIO IN level SW; -60dB</li> <li>S302/VR-118 (B-2A); ON</li> <li>After the adjustment, set the following switches and control as given below:           <ul style="list-style-type: none"> <li>CH-1 AUDIO IN level SW; +4dB</li> <li>CH-2 AUDIO IN level SW; +4dB</li> </ul> </li> </ul> <p>Audio oscillator Audio level meter</p>	CH-1/CH-2 AUDIO OUT (at 600-ohm load) $+12.0 \pm 0.2\text{dBm}$	CH-1, CH-2: <b>① RV201/KY-207 (J-3)</b>

## 7-6. PB FREQUENCY RESPONSE ADJUSTMENT

### Step 1. PB Frequency Response Check (Oxide)

Preparations for adjustment	Specifications	Adjustments										
<ul style="list-style-type: none"> <li>Play back 1kHz, 7kHz, 10kHz and 15kHz signal portion on the alignment tape CR8-1A PS.</li> </ul> <p>Audio level meter</p>	CH-1/CH-2 AUDIO OUT (at 600-ohm load) <table border="1" data-bbox="627 1245 1040 1403"> <thead> <tr> <th>Frequency</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>1kHz</td> <td>Reference</td> </tr> <tr> <td>7kHz</td> <td>Ref <math>\pm 0.3\text{dB}</math></td> </tr> <tr> <td>10kHz</td> <td>Ref <math>\pm 0.5\text{dB}</math></td> </tr> <tr> <td>15kHz</td> <td>Ref <math>\pm 0.7\text{dB}</math></td> </tr> </tbody> </table> <p>Caution: The individual audio levels should be corrected according to the correction value. (Refer to Paragraph 7-1, Note 1.)</p> <p>If the specification is not satisfied, perform Step 2.</p>	Frequency	Specification	1kHz	Reference	7kHz	Ref $\pm 0.3\text{dB}$	10kHz	Ref $\pm 0.5\text{dB}$	15kHz	Ref $\pm 0.7\text{dB}$	<ul style="list-style-type: none"> <li>7kHz adjustment CH-1: <b>① RV402/AU-142 (E-4)</b> CH-2: <b>① RV452/AU-142 (E-4)</b></li> <li>10kHz, 15kHz adjustment CH-1: <b>① RV404/AU-142 (D-4)</b> CH-2: <b>① RV454/AU-142 (D-4)</b></li> </ul>
Frequency	Specification											
1kHz	Reference											
7kHz	Ref $\pm 0.3\text{dB}$											
10kHz	Ref $\pm 0.5\text{dB}$											
15kHz	Ref $\pm 0.7\text{dB}$											

### Step 2. In case the high-frequency level is lower than the specified value:

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back 1kHz, 7kHz, 10kHz and 15kHz signal portion on the alignment tape CR8-1A PS.</li> </ul>	<ol style="list-style-type: none"> <li>Solder-bridge slots SL401 and SL451 and perform Step 1.</li> <li>If the specification is not satisfied: Solder-bridge slots SL402 and SL452 and perform Step 1.</li> <li>If the specification is not yet satisfied: Solder-bridge slots SL403 and SL453 and perform Step 1.</li> </ol>	CH-1: SL401-403/AU-142 (D-4) CH-2: SL451-453/AU-142 (D-4)

Continues to the next page.

## 7-6. PB FREQUENCY RESPONSE ADJUSTMENT (Continued)

### Step 3. PB Frequency Response Check (Metal)

Preparations for adjustment	Specifications	Adjustments										
<ul style="list-style-type: none"> <li>Play back 1kHz, 7kHz, 10kHz and 15kHz signal portion on the alignment tape CR8-1B PS.</li> </ul> <p>Audio level meter</p>	<p>CH-1/CH-2 AUDIO OUT (at 600-ohm load)</p> <table border="1"> <thead> <tr> <th>Frequency</th> <th>Specification</th> </tr> </thead> <tbody> <tr> <td>1kHz</td> <td>Reference</td> </tr> <tr> <td>7kHz</td> <td>Ref±0.3dB</td> </tr> <tr> <td>10kHz</td> <td>Ref±0.5dB</td> </tr> <tr> <td>15kHz</td> <td>Ref±0.5dB</td> </tr> </tbody> </table> <p>Caution: The individual audio levels should be corrected according to the correction value. (Refer to Paragraph 7-1, Note 1.)</p> <ul style="list-style-type: none"> <li>If the specification is not satisfied, perform Step 4.</li> </ul>	Frequency	Specification	1kHz	Reference	7kHz	Ref±0.3dB	10kHz	Ref±0.5dB	15kHz	Ref±0.5dB	<ul style="list-style-type: none"> <li>7kHz adjustment</li> </ul> <p>CH-1: <input checked="" type="checkbox"/> RV401/AU-142 (E-4) CH-2: <input checked="" type="checkbox"/> RV451/AU-142 (E-4)</p>
Frequency	Specification											
1kHz	Reference											
7kHz	Ref±0.3dB											
10kHz	Ref±0.5dB											
15kHz	Ref±0.5dB											

### Step 4. In case the high-frequency level is lower than the specified value:

Preparations for adjustment	Specifications	Adjustments
	<ol style="list-style-type: none"> <li>Solder-bridge slots SL401 and SL451 and perform Step 1 and 3.</li> <li>If the specification is not satisfied: Solder-bridge slots SL402 and SL452 and perform Step 1 and 3.</li> <li>If the specification is not yet satisfied: Solder-bridge slots SL403 and SL453 and perform Step 1 and 3.</li> </ol>	<p>CH-1: SL401-403/AU-142 (D-4)</p> <p>CH-2: SL451-453/AU-142 (D-4)</p>

## 7-7. PB LEVEL ADJUSTMENT

Step 1.

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back 1kHz, OVU signal portion on the alignment tape CR8-1B PS.</li> </ul>	CH-1 ; TP201/AU-142 (E-3) CH-2 ; TP202/AU-142 (E-3) $-10.0 \pm 0.2\text{dBs}$	CH-1 : $\bullet$ RV403/AU-142 (E-4) CH-2 : $\bullet$ RV453/AU-142 (E-4)

Step 2.

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back 1kHz, OVU signal portion on the alignment tape CR8-1A PS.</li> </ul>	CH-1 ; TP201/AU-142 (E-3) CH-2 ; TP202/AU-142 (E-3) $-10.0 \pm 0.5 \text{ dBs}$	(Check)

Step 3.

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>Play back 1kHz, OVU signal portion on the alignment tape CR8-1B PS.</li> </ul>	CH-1/CH-2 AUDIO OUT (at 600-ohm load) $+4.0 \pm 0.2\text{dBm}$	CH-1 : CH-1 PB VR on the front panel $=RV305/VR-118$ (C-2A) CH-2 : CH-2 PB VR on the front panel $=RV306/VR-118$ (C-2A) Caution: Once adjusted, the PB variable resistors should not be touched.

## 7-8. PB CHANNEL-TO-CHANNEL PHASE DIFFERENCE ADJUSTMENT

Prior to this adjustment perform para. 4-11 AUDIO HEAD PHASE ADJUSTMENT.

Preparations for adjustment	Specifications	Adjustment
<p><b>Step 1.</b></p> <ul style="list-style-type: none"> <li>Play back 15kHz, OVU signal portion on the alignment tape CR8-1B PS.</li> </ul> <p>Oscilloscope; Mode ..... X-Y</p>	<p>CH-1/CH-2 AUDIO OUT (at 600-ohm load)</p> <p><math>A \leq 5^\circ</math> (0.5 div.)</p>	① RV407/AU-142 (D-3)
<p><b>Step 2.</b></p> <ul style="list-style-type: none"> <li>DOLBY NR SW; ON</li> <li>Others; The same as for Step 1.</li> <li>After the check, return DOLBY NR switch to OFF.</li> </ul>	The same as for Step 1.	(Check)

## 7-9. FULL ERASE CURRENT ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>Insert a blank tape BCT-20M.</li> <li>REC mode</li> </ul> <p>AC voltmeter Oscilloscope</p>	TP1/FE-11 (1) $310 \pm 10\text{mV rms}$ (2) There should be no significant waveform distortion from sine wave.	② RV907/AU-142 (A-4)
Frequency counter	TP1/FE-11 $40 \pm 3\text{kHz}$	(Check)

## 7-10. DUB ERASE CURRENT ADJUSTMENT

### 7-10-1. CH-1 DUB Erase Current Adjustment

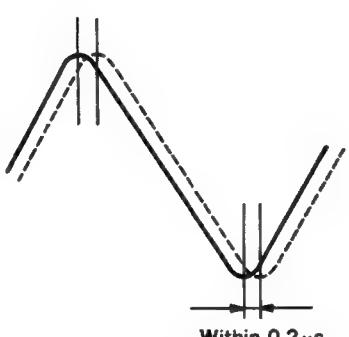
Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; No signal</li> <li>• Insert a CTL signal recorded cassette tape (metal).</li> <li>• Pseudo REC mode *</li> </ul>	Step 1. TP901/AU-142 (A-4)  $65 \pm 1 \text{ kHz}$	(Check)
	Step 2. TP901/AU-142 (A-4)  Maximize the level.	<span style="color: red;">●</span> LV901/AU-142 (A-4A) (on the front panel side)
AC voltmeter Frequency counter	Step 3. TP901/AU-142 (A-4)  $330 \pm 10 \text{ mV rms}$	<span style="color: red;">●</span> RV905/AU-142 (B-3)

### 7-10-2. CH-2 DUB Erase Current Adjustment

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; No signal</li> <li>• Insert a CTL signal recorded cassette tape (metal).</li> <li>• Pseudo REC mode*</li> </ul>	Step 1. TP902/AU-142 (A-4)  Maximize the level.	<span style="color: red;">●</span> LV902/AU-142 (A-4A) (on the front panel side)
AC voltmeter	Step 2. TP902/AU-142 (A-4)  $330 \pm 10 \text{ mV rms}$	<span style="color: red;">●</span> RV906/AU-142 (A-4)

\* Pseudo REC mode: This indicates a state in which a short is provided between TP501/AU-142 (A-3) and TP503/AU-142 (A-3).  
After the adjustment, remove the short.

### 7-10-3. CH-1 and CH-2 DUB Erase Current Phase Adjustment

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; No signal</li> <li>• Insert a CTL signal recorded cassette tape (metal).</li> <li>• Pseudo REC mode*</li> </ul>	<p>CH-1 ; TP901/AU-142 (A-4)      CH-2 ; TP902/AU-142 (A-4)</p> <p>(1) The phases of the CH-1 and CH-2 DUB Erase current should coincide with each other within <math>\pm 0.2\mu s</math> at the peaks.</p> 	<p>If the specification (1) is not satisfied, with respect to Paragraph 7-10-1 (CH-1 DUB level) and Paragraph 7-10-2 (CH-2 DUB level), the phase on the channel showing a higher level should be fine adjusted.</p> <p>( ) indicates the pin and adjustment on CH-2, in case the level of CH-2 is higher than that of CH-1.</p> <ol style="list-style-type: none"> <li>Connect an AC voltmeter to TP901/AU-142 (TP902/AU-142).</li> <li>Fine adjust so that the waveform at TP901/AU-142 (TP902/AU-142) coincide with the waveform at TP902/AU-142 (TP901/AU-142) at the peak positions using LV901/AU-142 (LV902/AU-142), and allow the specification (2) to be satisfied.</li> </ol>
AC voltmeter Oscilloscope TRIG .... IC903-①pin/AU-142 (A-3)	<p>(2) Level difference from previous adjustment <math>\leq 10 \text{ mV}</math></p>	

\* Pseudo REC mode: As described in Paragraph 7-10-2.

## 7-11. REC BIAS TRAP ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; No signal • Pseudo REC mode *	Step 1. (CH-1) TP402/AU-142 (D-3)  Maximize the level.	① T903/AU-142 (B-4A) ② T904/AU-142 (C-4A) Adjust alternately.
	Step 2. (CH-1) TP402/AU-142 (D-3)  Minimize the level. $\leq +10\text{dBs}$	① LV401/AU-142 (D-3A) If the specification is not satisfied, re-adjust from Step 1.
	Step 3. (CH-2) TP452/AU-142 (D-4)  Maximize the level.	① T905/AU-142 (B-4A) ② T906/AU-142 (C-4A) Adjust alternately.
Audio level meter	Step 4. (CH-2) TP452/AU-142 (D-4)  Minimize the level. $\leq +10\text{dBs}$	① LV451/AU-142 (D-4A) If the specification is not satisfied, re-adjust from Step 3.

\* Pseudo REC mode: As described in Paragraph 7-10-2.

## 7-12. BIAS CURRENT ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustments
• CH-1/CH-2 AUDIO IN; 1 kHz, +4dBs • Insert a blank tape BCT-20M. • REC mode	Step 1. CH-1 ; TP403/AU-142 (C-4) (GND) ; TP404/AU-142 (C-4)  $15.0 \pm 0.2\text{mV rms}$	① RV902/AU-142 (B-4) ② T903/AU-142 (B-4A) ③ T904/AU-142 (C-4A) Adjust alternately.
Audio oscillator AC digital voltmeter	Step 2. CH-2 ; TP453/AU-142 (D-4) (GND) ; TP454/AU-142 (D-4)  $15.0 \pm 0.2\text{mV rms}$	① RV904/AU-142 (C-3) ② T905/AU-142 (C-4A) ③ T906/AU-142 (C-4A) Adjust alternately.

## 7-13. DUB BIAS TRAP ADJUSTMENT

### Step 1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"><li>• CH-1/CH-2 AUDIO IN ; No signal</li><li>• Insert a CTL signal recorded cassette tape.</li><li>• CH-2; DUB mode</li></ul> <p>Audio level meter</p>	CH-1 ; TP405/AU-142 (E-3)  Minimize the level. (≤ -20dBs)	CH-1: ● LV402/AU-142 (E-3A)

### Step 2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"><li>• CH-1/CH-2 AUDIO IN ; No signal</li><li>• Insert a CTL signal recorded cassette tape.</li><li>• CH-1; DUB mode</li></ul> <p>Audio level meter</p>	CH-2 ; TP455/AU-142 (F-4)  Minimize the level. (≤ -20dBs)	CH-2: ● LV452/AU-142 (E-4A)

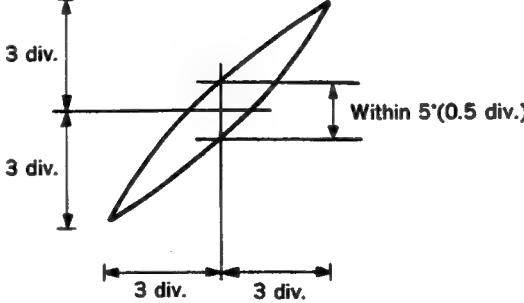
## 7-14. OVERALL FREQUENCY RESPONSE ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustments																
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 40Hz, 90Hz, 1kHz, 3kHz, 7kHz, 10kHz, 15kHz, -16dBs</li> <li>• S201/AU-142 (E-4A); CH-1</li> <li>• S202/AU-142 (E-4A); CP SW</li> <li>• NR SW on the connector panel; OFF</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-1/CH-2 AUDIO OUT (at 600-ohm load)</p> <table border="1"> <thead> <tr> <th>Frequency</th><th>Specification</th></tr> </thead> <tbody> <tr> <td>40Hz</td><td>Ref±3dB</td></tr> <tr> <td>90Hz</td><td>Ref±2.5dB</td></tr> <tr> <td>1kHz</td><td>Reference</td></tr> <tr> <td>3kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>7kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>10kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>15kHz</td><td>Ref±0.5dB</td></tr> </tbody> </table>	Frequency	Specification	40Hz	Ref±3dB	90Hz	Ref±2.5dB	1kHz	Reference	3kHz	Ref±0.5dB	7kHz	Ref±0.5dB	10kHz	Ref±0.5dB	15kHz	Ref±0.5dB	(Check)
Frequency	Specification																	
40Hz	Ref±3dB																	
90Hz	Ref±2.5dB																	
1kHz	Reference																	
3kHz	Ref±0.5dB																	
7kHz	Ref±0.5dB																	
10kHz	Ref±0.5dB																	
15kHz	Ref±0.5dB																	
<p>Step 2.</p> <p>[If the specification is not satisfied at 10kHz · 15kHz]</p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 10 kHz, +4dBs</li> <li>• REC mode</li> </ul>	<p>CH-1 ; TP403/AU-142 (C-4) (GND); TP404/AU-142 (C-4)</p> <p>CH-2 ; TP453/AU-142 (D-4) (GND); TP454/AU-142 (D-4)</p> <ul style="list-style-type: none"> <li>• Adjust in accordance with the difference at the 10kHz signal portion between the measured level and the specification in Step 1.</li> <li>• In case the measured level in Step 1 is higher. → Raise the level.</li> <li>• In case the measured level in Step 1 is lower. → Lower the level.</li> </ul>	<p>CH-1 : <b>●</b> RV305/AU-142 (B-3) CH-2 : <b>●</b> RV355/AU-142 (B-3)</p>																
<p>Step 3.</p> <p>[If the specification is not satisfied only at 15kHz]</p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 15 kHz, +4dBs</li> <li>• REC mode</li> </ul>	<p>Measuring points on CH-1/CH-2: The same as for Step 2.</p> <ul style="list-style-type: none"> <li>• Adjust by the difference (up to 0.3dB) at the 15kHz signal portion between the measured level and the specification in Step 1. If correcting by more than 0.3dB, perform the adjustment of Step 2.</li> <li>• After the adjustment, play back the recorded portion again and perform from Step 1 to check the frequency response.</li> </ul>	<p>CH-1 : <b>●</b> LV301/AU-142 (C-4A) CH-2 : <b>●</b> LV351/AU-142 (C-4A)</p>																

## 7-15. OVERALL LEVEL ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 1 kHz, +4dBs</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> </ul>	<p>Step 1.          CH-1 ; TP201/AU-142 (F-3)          CH-2 ; TP202/AU-142 (E-3)  <math>-10.0 \pm 0.2\text{dBs}</math></p>	(Check)
Audio oscillator Audio level meter	<p>Step 2.          If the specification is not satisfied, in the REC mode, measure and adjust the level at the following points corresponding to the difference between the measured value in Step 1 and the specified value.          CH-1 ; TP401/AU-142 (D-3)          CH-2 ; TP451/AU-142 (D-4)          After the adjustment, record and play back newly recorded portion again and perform Step 1 to check the level.</p>	CH-1 : RV303/AU-142 (D-2) CH-2 : RV353/AU-142 (D-3)
	<p>Step 3.          CH-1/CH-2 AUDIO OUT (at 600-ohm load)  <math>+4.0 \pm 0.4\text{dBm}</math></p>	(Check)

## 7-16. OVERALL PHASE ADJUSTMENT (METAL)

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 15 kHz, +4dBs</li> <li>• NR SW on the connector panel; ON</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> <li>• After the adjustment, return DOLBY NR switch to OFF.</li> </ul>	<p>CH-1/CH-2 AUDIO OUT (at 600-ohm load)</p>  <p>After adjusting RV301, repeat record and play back to reduce the phase difference to within <math>\pm 5^\circ</math>.</p>	RV301//AU-142 (D-2)

## 7-17. BIAS CURRENT ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN ; No signal</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> </ul>	<p>Step 1.</p> <p>CH-1 ; TP403/AU-142 (C-4)            CH-2 ; TP404/AU-142 (C-4)</p> <p style="text-align: center;"><math>11.0 \pm 0.2\text{mV rms}</math></p>	<p>① RV901/AU-142 (B-4)</p>
	<p>Step 2.</p> <p>CH-2 ; TP453/AU-142 (D-4)            (GND); TP454/AU-142 (D-4)</p> <p style="text-align: center;"><math>11.0 \pm 0.2\text{mV rms}</math></p>	<p>② RV903/AU-142 (B-3)</p>
AC voltmeter		

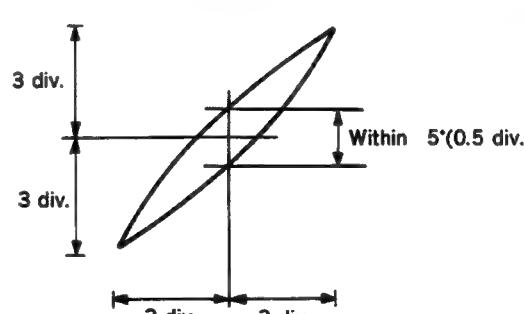
## 7-18. OVERALL FREQUENCY RESPONSE ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustments																
<p><b>Step 1.</b></p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 40Hz, 90Hz, 1kHz, 3kHz, 7kHz, 10kHz, 15kHz, -16dBs</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-1/CH-2 AUDIO OUT (at 600-ohm load)</p> <table border="1"> <thead> <tr> <th>Frequency</th><th>Specification</th></tr> </thead> <tbody> <tr> <td>40Hz</td><td>Ref±3dB</td></tr> <tr> <td>90Hz</td><td>Ref±2.5dB</td></tr> <tr> <td>1kHz</td><td>Reference</td></tr> <tr> <td>3kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>7kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>10kHz</td><td>Ref±0.5dB</td></tr> <tr> <td>15kHz</td><td>Ref±0.5dB</td></tr> </tbody> </table>	Frequency	Specification	40Hz	Ref±3dB	90Hz	Ref±2.5dB	1kHz	Reference	3kHz	Ref±0.5dB	7kHz	Ref±0.5dB	10kHz	Ref±0.5dB	15kHz	Ref±0.5dB	(Check)
Frequency	Specification																	
40Hz	Ref±3dB																	
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1kHz	Reference																	
3kHz	Ref±0.5dB																	
7kHz	Ref±0.5dB																	
10kHz	Ref±0.5dB																	
15kHz	Ref±0.5dB																	
<p><b>Step 2.</b></p> <p>[If the specification is not satisfied at 10kHz -15kHz]</p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 10kHz, +4dBs</li> <li>• REC mode</li> </ul>	<p>CH-1 ; TP403/AU-142 (C-4) (GND) ; TP404/AU-142 (C-4)</p> <p>CH-2 ; TP454/AU-142 (D-4) (GND) ; TP454/AU-142 (D-4)</p> <ul style="list-style-type: none"> <li>• Adjust in accordance with the level difference at the 10kHz signal portion between the measured level and the specification in Step 1.</li> <li>In case the measured value in Step 1 is higher. → Raise the level.</li> <li>In case the measured value in Step 1 is lower. → Lower the level.</li> </ul>	<p>CH-1 : <b>①</b> RV306/AU-142 (C-3)</p> <p>CH-2 : <b>②</b> RV356/AU-142 (C-3)</p>																
<p><b>Step 3.</b></p> <p>[If the specification is not satisfied only at 15kHz]</p> <ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 15kHz, +4dBs</li> <li>• REC mode</li> </ul>	<p>Measuring points on CH-1/CH-2: The same as for Step 2.</p> <ul style="list-style-type: none"> <li>• Correct by the difference at the 15kHz signal portion between the measured level and the specification in Step 1.</li> <li>• After the adjustment, record and play back newly recorded portion again and perform from Step 1 to check the frequency response.</li> <li>• After the adjustment, perform Paragraph 7-14. Overall Frequency Response Adjustment (Metal) again and correct the effect on the metal part.</li> </ul>	<p>CH-1 : <b>①</b> LV301/AU-142 (C-4A)</p> <p>CH-2 : <b>②</b> LV351/AU-142 (C-4A)</p>																

## 7-19. OVERALL LEVEL ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 1 kHz, +4dBs</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> </ul>	<p>Step 1.            CH-1; TP201/AU-142 (F-3)            CH-2; TP202/AU-142 (E-3)  <math>-10.0 \pm 0.2</math> dBs</p>	(Check)
Audio oscillator Audio level meter	<p>Step 2.            If the specification is not satisfied, in the REC mode, measure and adjust the level at the following points corresponding to the difference between the measured value in Step 1 and the specified value.            CH-1; TP401/AU-142 (D-3)            CH-2; TP451/AU-142 (D-4)            After the adjustment, record and play back newly recorded portion again and perform Step 1 to check the level.</p>	CH-1: RV304/AU-142 (D-2) CH-2: RV354/AU-142 (D-3)
	<p>Step 3.            CH-1/CH-2 AUDIO OUT (at 600-ohm load)  <math>+4.0 \pm 0.4</math> dBm</p>	(Check)

## 7-20. OVERALL PHASE ADJUSTMENT (OXIDE)

Preparations for adjustment	Specifications	Adjustment
<ul style="list-style-type: none"> <li>• CH-1/CH-2 AUDIO IN; 15 kHz, +4dBs</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> <li>• Play back the recorded portion.</li> </ul>	CH-1/CH-2 AUDIO OUT (at 600-ohm load)	RV302//AU-142 (D-3)
Audio oscillator Oscilloscope: Mode .... X-Y	 <p>After adjusting RV301, repeat record and play back to reduce the phase difference to within <math>\pm 5^\circ</math>.</p>	

## 7-21. CONFI OUTPUT LEVEL ADJUSTMENT

### 7-21-1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustment
<p><b>Step 1.</b></p> <ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; 1 kHz, +4dBs</li> <li>• CH-4 OUT SW; MON</li> <li>• CH-1 MONITOR SW; ON</li> <li>• CH-2 MONITOR SW; OFF</li> <li>• CONFI SW; ON</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> </ul> <p>Audio oscillator Audio noise meter; Filter .... WIDE BAND</p>	<p>CH-4 AUDIO OUT (at 600-ohm load)</p> <p>Output level=+4±1dBm</p>	<p>② RV801/AU-142 (F-3)</p>
<p><b>Step 2.</b></p> <p>Audio noise meter Filter .... DIN AUDIO</p> <ul style="list-style-type: none"> <li>• After the adjustment, return CH-1 MONITOR select switch to OFF.</li> </ul>	<p>CH-4 AUDIO OUT (at 600-ohm load)</p> <p>Difference from the output level in Step 1.</p> <p>0.0 <math>\pm_{-0.5}</math> dB</p>	(Check)

### 7-21-2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustment
<p><b>Step 1.</b></p> <ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; 1 kHz, +4dBs</li> <li>• CH-4 OUT SW; MON</li> <li>• CH-1 MONITOR SW; OFF</li> <li>• CH-2 MONITOR SW; ON</li> <li>• CONFI SW; ON</li> <li>• Insert a blank tape BCT-20G.</li> <li>• REC mode</li> </ul> <p>Audio oscillator Audio noise meter; Filter .... WIDE BAND</p>	<p>CH-4 AUDIO OUT (at 600-ohm load)</p> <p>Output level=+4±1dBm</p>	<p>② RV851/AU-142 (F-3)</p>
<p><b>Step 2.</b></p> <p>Audio noise meter Filter .... DIN AUDIO</p> <p>After the adjustment, return CH-2 MONITOR switch to OFF.</p>	<p>CH-4 AUDIO OUT (at 600-ohm load)</p> <p>Difference from the output level in Step 1.</p> <p>0.0 <math>\pm_{-0.5}</math> dB</p>	(Check)

## 7-22. DUB CROSSTALK CANCEL ADJUSTMENT

### Step 1. CH-1 Adjustment

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; 5 kHz, +4dBs</li> <li>• CH-2 AUDIO IN; No signal</li> <li>• Insert a BCT-20G cassette tape on which only CTL signals are recorded.</li> <li>• CH-1 DUB mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-2 AUDIO OUT (at 600-ohm load)</p> <p>Minimize the crosstalk (5kHz) from CH-1. The AUDIO OUT level difference between CH-1 and CH-2 should be 20dB or more. &lt;Reference&gt; Output level at the AUDIO OUT CH-1 (at 600-ohm load)</p> <p>Approx. +4dBm</p>	<p>① RV455/AU-142 (E-3) ② RV456/AU-142 (E-3) Adjust alternately.</p>

### Step 2. CH-2 Adjustment

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-1 AUDIO IN; No signal</li> <li>• CH-2 AUDIO IN; 5 kHz, +4dBs</li> <li>• Insert a BCT-20G cassette tape on which only CTL signals are recorded.</li> <li>• CH-2 DUB mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-1 AUDIO OUT (at 600-ohm load)</p> <p>Minimize the crosstalk (5kHz) from CH-2. The AUDIO OUT level difference between CH-1 and CH-2 should be 20dB or more. &lt;Reference&gt; Output level at the AUDIO OUT CH-2 (at 600-ohm load)</p> <p>Approx. +4dBm</p>	<p>① RV405/AU-142 (E-3) ② RV406/AU-142 (E-3) Adjust alternately.</p>

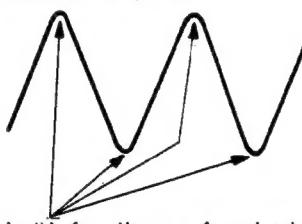
## 7-23. AFM REFERENCE LEVEL SETTING (2)

Preparations for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• CH-3/CH-4 AUDIO IN; 400Hz, -20dBs</li> <li>• CH-3/CH-4 -60/-20/+4dB select SW; -20dB</li> <li>• EE mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-3/CH-4 AUDIO OUT (at 600-ohm load)</p> <p>+4±0.1dBm</p>	<p>① CH-3 REC VR on the front panel ② CH-4 REC VR on the front panel Once adjusted, the REC variable resistors should not be touched unless otherwise specified.</p>

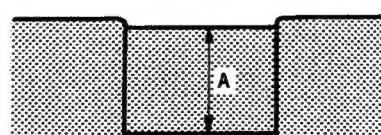
## 7-24. AFM CARRIER FREQUENCY ADJUSTMENT

Preparations for adjustment	Specifications	Adjustments
• CH-3/CH-4 AUDIO IN; No signal • EE mode  Frequency counter	TP605/AU-142 (D-1)  $310 \pm 1\text{kHz}$	CH-3: ① RV604/AU-142 (C-2)
	TP655/AU-142 (D-1)  $540 \pm 1\text{kHz}$	CH-4: ① RV654/AU-142 (C-2)

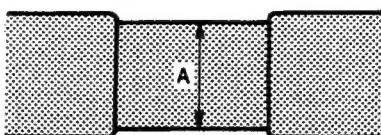
## 7-25. AFM CLIPPER LEVEL ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
• CH-3/CH-4 AUDIO IN; 400Hz, -0.5dBs • CH-3/CH-4 -60/-20/+4dB select SW; -20dB • EE mode  Audio oscillator Audio level meter	CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2)    Adjust to just before the waveform begins to be clipped.	CH-3/CH-4: ① RV602/AU-142 (F-2)

## 7-26. AFM SQUELCH SENSITIVITY ADJUSTMENT

Machine conditions for adjustment	Specifications	Adjustment
• Play back the 400Hz sine wave (25kHz deviation) signal portion on the alignment tape CR5-1B PS.  Oscilloscope; TRIG .... TP705/AU-142	TP702/AU-142 (A-1)  $A = 800 \pm 50\text{mVp-p}$    Measure the voltage amplitude A on the channel showing a lower amplitude.	① RV702/AU-142 (A-2)

## 7-27. AFM RECORDING CURRENT ADJUSTMENT

Preparations for adjustment	Specifications	Adjustment
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• CH-3/CH-4 AUDIO IN; No signal</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mod</li> <li>• Play back the recorded portion.</li> </ul>	<p>1. TP702/AU-142 (A-1) <math>A=800\pm50\text{mV}</math></p>  <p>Measure the voltage amplitude A on the channel showing a lower amplitude.</p>	(Check)
<p>Oscilloscope: TRIG .... CN302-⑤ pin/AU-142 (E-1)</p>	<p>2. TP701/AU-142 (E-1)</p> <p>Measure and record the level in the REC mode. If the specification is not satisfied, perform Step 2.</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• CH-3/CH-4 AUDIO IN: No signal</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mod</li> <li>• Play back the recorded portion.</li> </ul>	<p>TP701/AU-142 (E-1)</p> <p>Correct the level at TP701/AU-12 by the ratio of the measured value of the width A in Step 1 to the specified value.</p> <p>If the measured value of A is lower than the specified value, raise the level at TP701/AU-142.</p> <p>If the measured value of A is higher than the specified value, lower the level at TP701/AU-142.</p>	① RV701/AU-142 (E-1)
<p>Oscilloscope</p>		
<p>Step 3.</p> <ul style="list-style-type: none"> <li>• The same as for Step 1.</li> </ul>	<p>Repeat Step 1.</p>	(Check)

## 7-28. AFM PB LEVEL ADJUSTMENT

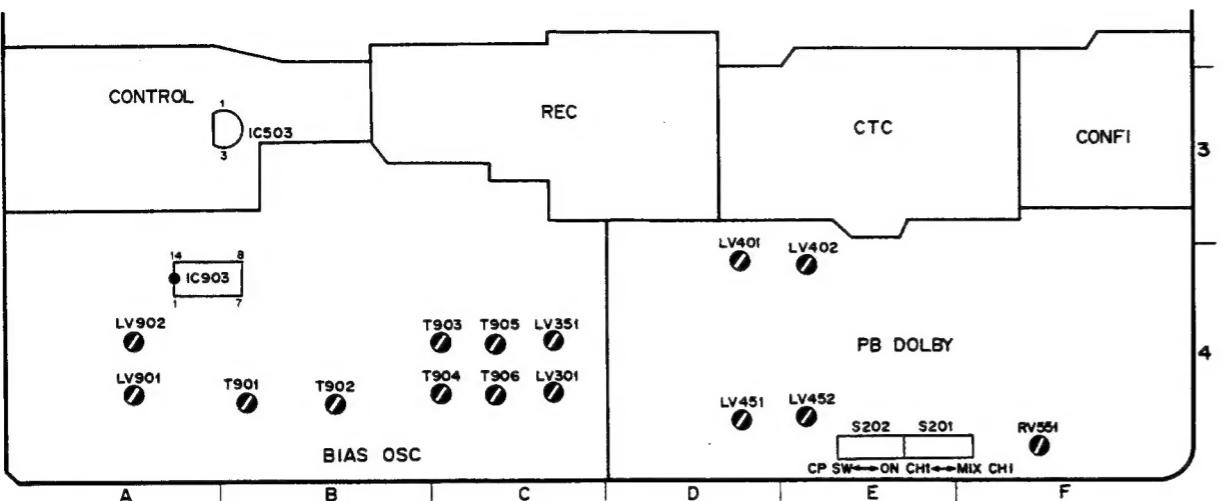
Machine conditions for adjustment	Specifications	Adjustments
<ul style="list-style-type: none"> <li>• Play back the 400Hz sine wave (25kHz deviation) signal portion on the alignment tape CR5-1B PS.</li> </ul>	<p>Step 1. CH-3; TP703/AU-142 (A-1) CH-4; TP704/AU-142 (A-1)</p> <p><math>-12.0\pm0.2\text{dBs}</math></p>	<p>CH-3: ① RV603/AU-142 (B-1) CH-4: ① RV653/AU-142 (C-1)</p>
<p>Audio level meter</p>	<p>Step 2. CH-3/CH-4 AUDIO OUT (at 600-ohm load)</p> <p><math>+4.0\pm0.2\text{dBm}</math></p>	<p>CH-3: ① CH-3 PB VR on the front panel =RV307/VR-118 (D-2A)</p> <p>CH-4: ① CH-4 PB VR on the front panel =RV308/VR-118 (D-2A)</p>

## 7-29. AFM DEVIATION ADJUSTMENT

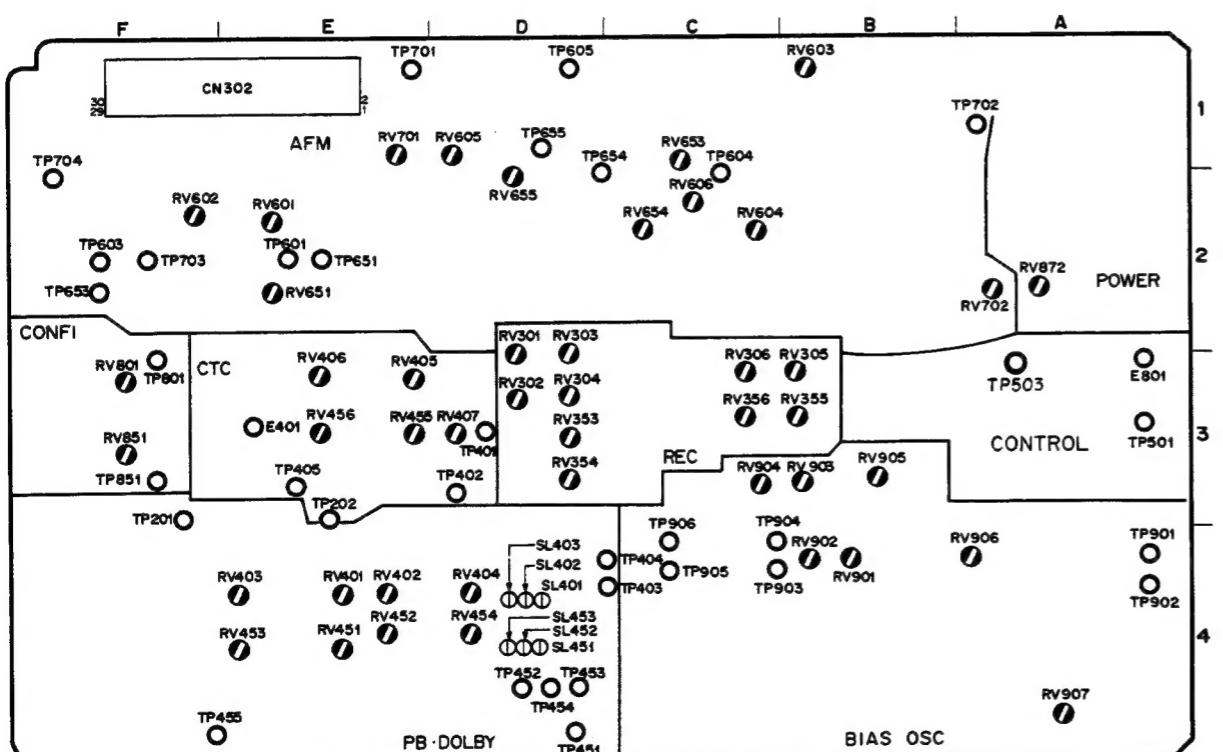
This adjustment should be made after performing, the AFM PB Level Adjustment and the AFM Recording Current Adjustment.

Preparations for adjustment	Specifications	Adjustments
<p>Step 1.</p> <ul style="list-style-type: none"> <li>• CH-3/CH-4 AUDIO IN: 400Hz, -20dBs</li> <li>• CH-3/CH-4, -60/-20/+4dB select SW; -20dB (on the connector panel)</li> <li>• Insert a blank tape BCT-20M.</li> <li>• REC mode</li> </ul> <p>Audio oscillator Audio level meter</p>	<p>CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2)</p> <p>Measure and record the output level at TP603 and TP653.</p>	
<p>Step 2.</p> <ul style="list-style-type: none"> <li>• Play back the recorded portion.</li> </ul>	<p>CH-3/CH-4 AUDIO OUT (at 600-ohm load)</p> <p>+4.0±0.5dBm</p> <p>If the specification is not satisfied, perform Step 3.</p>	(Check)
<p>Step 3.</p> <ul style="list-style-type: none"> <li>• (The same as for Step 1.)</li> </ul>	<p>Repeat Step 1. At this time, change the level at the following points of measurement from the measured values in Step 1 by the level difference with respect to +4.0dBm at the AUDIO OUT CH-1/CH-2 connector in Step 2; CH-3; TP603/AU-142 (F-2) CH-4; TP653/AU-142 (F-2)</p> <p>Then, perform Step 2. again for verification.</p> <p>Reference&gt;</p> <p>CH-3; TP605/AU-142 (D-1) CH-4; TP655/AU-142 (D-1)</p> <p>After the adjustment, the frequency deviation at the above points of measurement should be</p> <p>25.0±0.2kHz</p>	<p>CH-3: <del>②</del> RV601/AU-142 (E-2) CH-4: <del>②</del> RV651/AU-142 (E-2)</p>

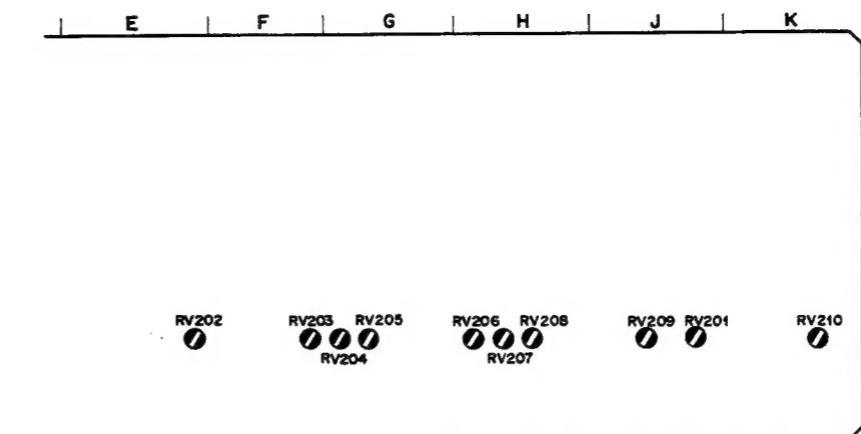
## **Locations of ICs, LVs, Ss and Ts on AU-142 board. (A SIDE)**



#### **Location of CN, SLs, TPs and RVs on AU-142 board. (B SIDE)**



### **Locations of RVs on KY-207 board. (A SIDE)**



## **Locations S and RVs on VR-118 board (A SIDE)**

